DATA VALIDATION REPORT 2012 REMEDIAL INVESTIGATION/FEASIBILITY STUDY

OPERABLE UNIT 2 JUNE 2012 SURFACE WATER/ SEDIMENT SAMPLING EVENT

OLIN CHEMICAL SUPERFUND SITE 51 EAMES STREET WILMINGTON, MASSACHUSETTS

Submitted to:



Olin Corporation 3855 North Ocoee Street, Suite 200 Cleveland, TN 37312

Prepared by:



AMEC Environment & Infrastructure, Inc.
107 Audubon Road
Wakefield, Massachusetts 01880

November 6, 2012

AMEC Project Number: 6107120016.01.10

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Peter H. Thompson

with permission for Project Manager

Michael J. Murphy

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LIST OF ACRONYMS

APHA American Public Health Association
AMEC AMEC Environment & Infrastructure, Inc.

DMF N,N-Dimethylformamide

EDD Electronic Data Deliverable

GC/NPD Gas Chromatograph/Nitrogen-Phosphorous Detector

HPLC High Performance Liquid Chromatography

HT Holding Time

J Estimated value

LC/MS/MS Liquid Chromatography/Dual Mass Spectrometry

LCS Laboratory Control Sample

LCSD Laboratory Control Sample Duplicate

MACTEC Engineering and Consulting, Inc.

MassDEP Massachusetts Department of Environmental Protection

MCP Massachusetts Contingency Plan

MMH Monomethylhydrazine

MS/MSD Matrix Spikes/Matrix Spike Duplicate

μg/L Microgram per liter

ND Non-detect

NDMA N-nitrosodimethylamine

PE Performance Evaluation

QAPP Quality Assurance Project Plan

QC Quality Control

RI/FS Remedial Investigation/Feasibility Study

RPD Relative Percent Difference

SDG Sample Delivery Group

SVOC Semivolatile Organic Compound

TAL Target Analyte List

TIC Tentatively Identified Compound

TOC Total Organic Carbon
TSS Total Suspended Solids



U Not detected

UDMH Unsymmetrical Dimethylhydrazine

UJ Not detected estimated

USEPA United States Environmental Protection Agency

VOC Volatile Organic Compound



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1.0 INTRODUCTION

One surface water and sediment location was sampled at the Olin Chemical Superfund Site in June 2012 as specified in the Remedial Investigation/Feasibility Study (RI/FS) Work Plan (MACTEC Engineering and Consulting, Inc. [MACTEC], 2009, now AMEC Environment & Infrastructure, Inc.). Samples were analyzed by one or more of the following United States Environmental Protection Agency (USEPA) SW-846 (USEPA, 1996a), USEPA wastewater (USEPA, 1993), Standard Methods American Public Health Association ([APHA], 1995) or laboratory developed methods:

Laboratory	aboratory Parameter		Validation Level
TestAmerica - Westfield, MA	Volatile Organic Compounds (VOCs)	SW-846 8260C	Olin Level 1
TestAmerica - Westfield, MA	Semivolatile Organic Compounds (SVOCs)	SW-846 8270D – Low Level	Olin Level 1
TestAmerica - Westfield, MA	Diphenylamine (sediment only)	SW-846 8270D – Low Level	Olin Level 1
TestAmerica - West Sacramento, CA	N-Nitrosodimethylamine (NDMA) & N-nitroso-di-n- propylamine	Modified 521	Olin Level I
TestAmerica - Westfield, MA	TAL Metals plus tin	SW-846 6010C/Hg by 7470A	Olin Level 1
TestAmerica – Irvine, CA	Metals (copper, lead, silver)	SW-846 6020A	Olin Level 1
TestAmerica - Westfield, MA	Ammonia	QuickChem: LACHAT 10-107- 06-1-B	Olin Level 1
TestAmerica - Westfield, MA	Anions (chloride, sulfate, nitrate, nitrite, bromide)	EPA 300.0	Olin Level 1
TestAmerica - Tallahassee, FL	Formaldehyde / Acetaldehyde	SW-846 8315A	Chemist Review
TestAmerica - Tallahassee, FL	Phthalic Anhydride	Lab Specific TAL-TALL LC65	Chemist Review
TestAmerica - Westfield, MA	Total Organic Carbon (TOC)	Lloyd Kahn	Chemist Review
TestAmerica - Westfield, MA	Hardness	SM 2340B	Chemist Review
TestAmerica - Westfield, MA	Total Suspended Solids (TSS)	SM 2540D	Chemist Review
Katahdin Analytical Services - Scarborough, ME	N,N-dimethylformamide	Modified 8033 - GC/NPD	Chemist Review
Lancaster Laboratory - Lancaster, PA	Hydrazine / MMH / UDMH	Modified 8315 LC/MS/MS	Chemist Review
Lancaster Laboratory - Lancaster, PA	Opex and Kempore	Lab Specific HPLC Method 8000B	Chemist Review



A summary of samples (by sample delivery group [SDG]) included in this data validation report is presented in Table 1. Analytical data packages were reviewed in accordance with the Olin Chemical Superfund Site Final RI/FS Work Plan Quality Assurance Project Plan (QAPP) [MACTEC, 2009]. Volatile organic compounds (VOCs), semivolatile organic compounds (SVOC), and metals data were validated using the Region I EPA-New England Data Validation Functional Guidelines (USEPA, 1996b) and the Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods Used in Support of Response Actions for the Massachusetts Contingency Plan (MCP) (MassDEP, 2010). USEPA Region I data validation procedures for SW-846 Methods were modified to include method-specific criteria (i.e., measurement performance criteria detailed in the QAPP) from the MCP Methods. For other methods that were not addressed in USEPA Region I guidelines or the MCP Compendium, method performance criteria were developed for this project. Validation levels for each method (Olin Level 1, chemist review) are summarized above.

Final validated sample results are presented in Table 2. Documentation of data validation actions is presented in Table 3. Tables 3 includes final results that have been qualified (data validation has resulted in revisions to the laboratory result) as well as the associated validation reason codes. An index of the reason codes is presented on the last page of Table 3.

Tentatively identified compounds (TICs) were reported by the laboratory, if detected, in samples analyzed for VOCs and SVOCs. TICs were evaluated during validation and were removed from the data set if reported in associated method blanks. SVOC TICs, discussed in Section 3, are presented by SDG in Table 4.

Performance evaluation (PE) samples were submitted to the laboratory during previous rounds of RI groundwater sampling. No PE samples were submitted with this round of sampling.

N-nitrosodi-n-propylamine was included as a SVOC target compound in Method 8270D and the low detection limit analysis by modified USEPA Method 521 for surface water. Both sets of data were reported by the laboratory. The Method 521 data had lower reporting limits when compared to the SVOC method. For N-nitrosodi-n-propylamine the Method 521 analyses were used for reporting final results, and the Method 8270D results for N-nitrosodi-n-propylamine were removed from the final data set.



2.0 VOLATILE ORGANIC COMPOUNDS

Samples were analyzed for VOCs by Method 8260C. Data were evaluated based on the following parameters:

- * Data Completeness
- * Holding Time (HT) and Preservation
- * Blanks
 - Laboratory Control Sample (LCS)
- * Surrogate Recovery
- * Detection Limits
- * Sample Result Verification / Electronic Data Deliverable (EDD)
- * TICs
- * Results Reporting
- * = indicates that criteria were met for this parameter

Except for the validation actions noted below, sample results are interpreted to be usable as reported by the laboratory.

2.1 Laboratory Control Samples

The sample results were qualified due to due to LCS and/or laboratory control sample duplicate (LCSD) percent recoveries that were outside project quality control (QC) goals of 40-160 (for select compounds) and LCS/LCSD relative percent difference (RPD) that was outside laboratory QC goals of 20. Qualified results are summarized on Table 3 with a reason code LCS-L or LCS-RPD.

Surface Water

The LCS/LCSD RPD of 1,2,3-trichloropropane (22) was outside of the QC limits. 1,2,3-trichloropropane was not detected in the associated sample and the reporting limits were qualified as estimated (UJ).

Sediment

The LCS/LCSD percent recoveries of acetone (36 and 37) were outside of the QC limits. Acetone was not detected in the associated samples and the reporting limits were qualified as estimated (UJ).



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3.0 SEMIVOLATILE ORGANIC COMPOUNDS

Samples were analyzed for SVOCs by Method 8270D (low level method). A subset of samples was also analyzed for N-nitrosodimethylamine (NDMA) by modified Method 8270. Data validation actions for both methods are reported in this section. Additional analyses for diphenylamine were requested for sediment SVOC samples. The routine SVOC method cannot distinguish between diphenylamine and N-nitrosodiphenylamine and all results for both compounds are reported as N-nitrosodiphenylamine in Method 8270D. Clean up procedures described in the QAPP were requested at the time of sample collection. The lab was instructed to perform the cleanup and report separate results for the two compounds if N-nitrosodiphenylamine was detected. No samples had detections of N-nitrosodiphenylamine, and diphenylamine is reported as non-detect (ND).

Data were evaluated based on the following parameters:

- Data Completeness
- Holding Time and Preservation Blanks
 Laboratory Control Sample
- * Surrogate Recovery Detection Limits
- * Sample Result Verification / EDD TICs
 Result Reporting
- * = indicates that criteria were met for this parameter

Except for the validation actions noted below, the results are interpreted to be usable as reported by the laboratory.

3.1 Blanks

Various compounds and various compounds reported as TICs were detected at low concentrations in method blanks. Sample results were qualified in accordance with the USEPA Region I guidelines. A summary of method blank qualification actions is presented in Table 3 for SVOCs with results being assigned a validation qualifier reason code of BL1. Detailed discussions of qualification action are presented in the following sections.

Surface Water

Acetophenone (0.67 micrograms per liter $[\mu g/L]$) and di-n-butyl phthalate (1.16 $\mu g/L$) were reported in the method blank. Action levels were established at five times the reported blank concentration for acetophenone and at ten times the reported blank concentration for di-n-butyl phthalate. Acetophenone was not detected in the associated sample, and no action was



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necessary. Di-n-butyl phthalate was detected at less than the action levels and less than the reporting limits and was qualified not detected (U) at the reporting limit.

Sediment

Bis(2-ethylhexl) phthalate (16.5 micrograms per kilogram [μ g/kg]) and di-n-butyl phthalate (185 μ g/kg) were reported in the method blank. Action levels were established at ten times the reported blank concentration for bis(2-ethylhexl) phthalate and di-n-butyl phthalate. Associated sample detections of bis(2-ethylhexl) phthalate and di-n-butyl phthalate that were less than the action levels and less than the reporting limits were qualified not detected (U) at the reporting limits.

TICs reported in the sample were compared to TICs reported in associated method blanks. TICs that were reported in method blanks and in the associated sample were rejected and not reported in the final data.

3.2 Laboratory Control Samples

A subset of sample results was qualified due to LCS and/or LCSD that were outside project QC goals. Qualified results are summarized on Table 3 with reason codes LCS-L or LCS-H.

Surface Water

The following compounds had percent recoveries that were outside the control limits in the LCS/LCSD: aniline (39) and caprolactam (33 and 32). Aniline and caprolactam were not detected in the associated sample and the reporting limits were qualified estimated (UJ).

Sediment

The following compounds had percent recoveries that were outside of control limits in the LCS/LCSD: 2,4,4-trichlorophenol (138), 2,4,6-trichlorophenol (141), 3&4 methylphenol (133), aniline (38), benzo(a)anthracene (142), benzo(b)fluoranthene (152), carbazole (152), di-n-butyl phthalate (191 and 159) and fluoranthene (153). 2,4,4-trichlorophenol, 2,4,6-trichlorophenol, 3&4 methylphenol, carbazole, and di-n-butyl phthalate were not detected in the associated sample and no qualification was required. Results for aniline, benzo(a)anthracene, benzo(b)fluoranthene and fluoranthene were qualified estimated (J/UJ) in the associated sample.

3.3 Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) reported in the sample were evaluated by the project chemist. TICs reported in QC blanks and those identified as common lab contaminants in the validation guidelines were removed from the final TIC data summary (Table 4).



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3.4 Result Reporting

Surface Water

N-nitrosodi-n-propylamine was analyzed using both the 8270D and modified 521 methods. N-nitrosodi-n-propylamine was not detected in either method and results from the modified 521 with lower reporting limits were reported in the final data set.

Sediment

Field sample OC-SD-EDSD/SW7-XXX was extracted at a 20-fold dilution due to unknown hydrocarbons. Reporting limits for target compounds in this sample were elevated due to the dilution.



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4.0 N-NITROSODIMETHYLAMINE & N-NITROSODI-N-PROPYLAMINE

Samples were analyzed for NDMA and N-nitrosodi-n-propylamine by modified USEPA Method 521 Modified (TAL method WS-MS-0012). Data were evaluated based on the following parameters:

- * Data Completeness
- * HT and Preservation
- * Blanks
- Laboratory Control Sample
- * Internal Standard Response
- * Detection Limits
- * Sample Result Verification / EDD
- * = indicates that criteria were met for this parameter

Results are interpreted to be usable as reported by the laboratory.



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5.0 TARGET ANALYTE LIST METALS (INCLUDING MERCURY)

Samples were analyzed for Target Analyte List (TAL) metals (plus tin) by SW-846 Method 6010C and Method 6020A (copper, lead and silver), and mercury by SW-846 Method 7470A. Data were reviewed for the following parameters:

- * Data Completeness
- * HT and Sample Preservation Blanks
- * Laboratory Control Sample
- * Detection Limits
- * Sample Result Verification / EDD
- * = indicates that criteria were met for this parameter

Except for the validation actions noted below, the results are interpreted to be usable as reported by the laboratory.

5.1 Blanks

The laboratory qualified sample results associated with method blank detections with a B. After review of the method blanks, the B qualifiers were removed.

Surface Water

Iron (21.6 μ g/L), manganese (1.31 μ g/L), and potassium (498 μ g/L) were detected in the method blank. Action levels were established at five times the concentration reported in the method blank and compared to sample results. Sample results were above the action levels; no action is required.

Sediment

Calcium (7.66 milligram per kilogram [mg/kg]), iron (2.6 mg/kg), magnesium (2.01 mg/kg), and tin (6.45 mg/kg) were detected in the method blank. Action levels were established at five times the concentration reported in the method blank and compared to sample results. Low concentration detections below the reporting limit and below the action level of the elements listed above were qualified not detected (U) at the reporting limit. A summary of method blank qualification actions is presented in Table 3 with results being assigned a validation qualifier reason code of BL1.



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6.0 GENERAL CHEMISTRY (ANIONS, AMMONIA, TOC, HARDNESS, TSS)

An Olin Level 1 validation was performed on the data. Data were evaluated based on the following parameters:

- * Data Completeness
- * Holding Time
- * Blanks
- Laboratory Control Sample
- * Matrix Spike Analysis
- * Laboratory Duplicate Analysis
- Field Duplicates
 Detection Limits
- * Sample Result Verification / EDD
- * = indicates that criteria were met for this parameter

Except for the validation actions noted below, the results are interpreted to be usable as reported by the laboratory.

6.1 Detection Limits

Sample OC-SW-EDSD/SW7-XXX was analyzed at a dilution due elevated concentrations of target analytes and/or matrix issues. Nitrite as N was reported as not detected at an elevated reporting limit.



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7.0 FORMALDEHYDE/ACETALDEHYDE

Samples were analyzed for formaldehyde and acetaldehyde by SW-846 Method 8315. Data were evaluated based on the following parameters:

- * Data Completeness
- * Holding Time
- * Blanks
- Laboratory Control Sample Matrix Spike Analysis
- * Detection Limits
- * Sample Result Verification / EDD
- * = indicates that criteria were met for this parameter

Except for the validation actions noted below, the results are interpreted to be usable as reported by the laboratory.

7.1 Matrix Spike Analysis

Sediment

Sample OC-SD-EDSD/SW7-XXX was submitted for Matrix Spikes/Matrix Spikes Duplicate (MS/MSD) analysis. The MS and MSD percent recoveries of acetaldehyde were outside of QC limits. Acetaldehyde was not detected in sample OC-SD-EDSD/SW7-XXX and the reporting limits were qualified as estimated (UJ).



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8.0 PHTHALIC ANHYDRIDE

Samples were analyzed for phthalic anhydride by a laboratory specific modified method 8000 – High Performance Liquid Chromatography (HPLC) (TestAmerica – Tallahassee: method LC65). A chemist review was performed on the phthalic anhydride data set. Data were evaluated based on the following parameters:

- * Data Completeness
- * Holding Time and Preservation
- * Blanks
- Laboratory Control Sample
- Matrix Spike Analysis
- * Detection Limits
- * Sample Result Verification / EDD
- * = indicates that criteria were met for this parameter

Results are interpreted to be usable as reported by the laboratory.



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9.0 HYDRAZINE, MONOMETHYLHYDRAZINE, UNSYMMETRICAL DIMETHYLHYDRAZINE

Samples were analyzed for hydrazine, monomethylhydrazine (MMH), and unsymmetrical dimethylhydrazine (UDMH) by a modified SW-846 Method 8315A LC/MS/MS. Reporting limits were hydrazine (2 μ g/kg), MMH (5 μ g/kg), and UDMH (5 μ g/kg) for solid samples. Data were evaluated based on the following parameters:

- * Data Completeness
- Holding Time and Sample Preservation
- * Blanks
- Laboratory Control Sample
 Matrix Spike Analysis
- Detection Limits
- * Sample Result Verification / EDD
- * = indicates that criteria were met for this parameter

Results are interpreted to be usable as reported by the laboratory.

9.1 Matrix Spike Analysis

<u>Sediment</u>

Sample OC-SD-EDSD/SW7-XXX was submitted for MS/MSD analysis. The MS and MSD percent recoveries of MMH and UDMH were outside of QC limits. Recoveries of MMH (6 percent) and UDMH (14 and 16 percent) were low. These compounds were not detected in sample OC-SD-EDSD/SW7-XXX. Professional judgment was used not to qualify the reporting limits of MMH and UDMH based on LCS/LCSD percent recoveries being within QC standards and the known instability of hydrazine compounds in some media.



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10.0 N, N-DIMETHYLFORMAMIDE

Samples were analyzed for N,N-Dimethylformamide (DMF) by a modified SW-846 Method 8033 gas chromatograph/nitrogen-phosphorous detector (GC/NPD). Reporting limits were 20 μ g/L for aqueous samples. Data were reviewed for the following parameters:

- * Data Completeness
- * Holding Time
- * Blanks
- Laboratory Control Sample
- * Surrogate Recovery
- * Detection Limits
- * Sample Result Verification / EDD
- * = indicates that criteria were met for this parameter

The results are interpreted to be usable as reported by the laboratory.



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11.0 OPEX AND KEMPORE

Samples were analyzed for Opex and Kempore by modified Method 8000B – HPLC (Lancaster Laboratory – Lancaster, Pennsylvania: Determination of Dinitrosopentamethylenetetramine (Opex) in Water, and Determination of Azodicarbonamide (Kempore) in Water). A chemist review was performed on the Opex and Kempore data sets. Data were reviewed for the following parameters:

- Data CompletenessHT and Preservation
- * Blanks
- Laboratory Control Sample
- * Detection Limits
- * Compound Identification
- * Sample Result Verification / EDD
- * = indicates that criteria were met for this parameter

Except for the validation actions noted below, the results are interpreted to be usable as reported by the laboratory.

11.1 Holding Time and Sample Preservation

Surface Water

Samples were collected on 6/18/12 and analyzed on 6/27/12. Holding time was exceeded by two days. Kempore was not detected in sample OC-SW-EDSD/SW7-XXX and the reporting limits were qualified estimated (UJ).



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12.0 REFERENCES

- American Public Health Association (APHA), 1995. "Standard Methods for Examination of Water and Wastewater"; 19th Edition; APHA, 1015 Fifteenth St., NW., Washington, D.C. 2005.
- MACTEC Engineering and Consulting, Inc. (MACTEC), 2009. "Final Remedial Investigation/Feasibility Study Project Operations Plan"; Volume III-B Quality Assurance Project Plan; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; August 14, 2009.
- Massachusetts Department of Environmental Protection (MassDEP), 2010. "The Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods Used in Support of Response Actions for the Massachusetts Contingency Plan (MCP)"; Bureau of Waste Site Cleanup; 1 Winter Street, Boston, Massachusetts 02108; WSC-CAM; July 2010.
- United States Environmental Protection Agency (USEPA), 1993. "Methods for Chemical Analysis and Water and Wastes (MCAWW)", EPA/600/4-79-020 (March 1983) with updates and supplements EPA/600/4-91-010 (June 1991), EPA/600/R-92-129 (August 1992) and EPA/600/R-93-100 (August 1993).
- USEPA, 1996a. "Test Methods for Evaluating Solid Waste"; Laboratory Manual Physical/Chemical Methods; Office of Solid Waste and Emergency Response; Washington, DC; SW-846; November 1986; Revision 4 December 1996.
- USEPA, 1996b. "Region 1 EPA-NE Data Validation Guidelines for Evaluating Environmental Analyses"; Quality Assurance Unit Staff; Office of Environmental Measurement and Evaluation; December 1996.

Data validation was completed by project chemists:

Michael Washburn



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TABLES

Table 1 **Sample Summary**

Data Validation Report

Operable Unit 2 June 2012 Surface Water and Sediment Sampling Event **Olin Chemical Superfund Site**

Wilmington, Massachusetts

Sample	Field	Date	TestAmerica	SW8260C	SW8270D	WS-MS-0012	SW6010 Metals	SW6020 Metals	SW7470A/ SW7471A Mercury	E300
Location	Sample ID	Sampled	Sample ID	VOCs	SVOCs	NDMA	Total	Total	Total	Anions
EDSD/SW7	OC-SW-EDSD/SW7-XXX	6/18/2012	360-41200-1	77	71	2	20	3	1	5
EDSD/SW7	OC-SD-EDSD/SW7-XXX	6/18/2012	360-41203-1	77	80		23		1	5

Sample	Field	Date	TestAmerica	E350.1 (QuickChem 10-107-06-1-B)	LC65 Phthalic	SW8315 Formaldehyde/	A2340B	A2540D	Lloyd Kahn/ A5310_TOC_B	E160.3 Percent
Location	Sample ID	Sampled	Sample ID	Ammonia	Anhydride	Acetaldehyde	Hardness	TSS	TOC	Solid
EDSD/SW7	OC-SW-EDSD/SW7-XXX	6/18/2012	360-41200-1	1			1	1	1	
EDSD/SW7	OC-SD-EDSD/SW7-XXX	6/18/2012	360-41203-1	1	1	2			1	2

					SW8315A		
Sample	Field	Date	Lancaster	SW8000B	MOD	Katahdin	SW8033M
Location	Sample ID	Sampled	Sample ID	Opex / Kempore	Hydrazine	Sample ID	DMF
EDSD/SW7	OC-SW-EDSD/SW7-XXX	6/18/2012	1316839	2			
EDSD/SW7	OC-SD-EDSD/SW7-XXX	6/18/2012	1317239		3	SF3645-1	1

Notes:

Number listed under method indicates the number of target analytes reported.

Prepared by / Date: KJC 08/08/12 Checked by / Date: MJW 10/01/12

			Loc Name	EDSD/SW7
			eld Sample ID	OC-SD-EDSD/SW7-XXX
		Field	Sample Date	06/18/12
		Lab Sample D	QC Code	FS 360-41203-1
Frac	Method	Analyte	Units	Result Qual
N	SW8260C	1,1,1,2-Tetrachloroethane	ug/kg	2.5 U
N	SW8260C	1,1,1-Trichloroethane	ug/kg	2.5 U
N	SW8260C	1,1,2,2-Tetrachloroethane	ug/kg	2.5 U
N	SW8260C	1,1,2-Trichloro-1,2,2-Trifluoroethane	ug/kg	13 U
N	SW8260C	1,1,2-Trichloroethane	ug/kg	2.5 U
N	SW8260C	1,1-Dichloroethane	ug/kg	2.5 U
N	SW8260C	1,1-Dichloroethene	ug/kg	2.5 U
N N	SW8260C SW8260C	1,1-Dichloropropene 1,2,3-Trichlorobenzene	ug/kg	2.5 U 2.5 U
N	SW8260C	1,2,3-Trichloropropane	ug/kg ug/kg	2.5 U
N	SW8260C	1,2,4-Trichlorobenzene	ug/kg ug/kg	2.5 U
N	SW8260C	1,2,4-Trimethylbenzene	ug/kg ug/kg	2.5 U
N	SW8260C	1,2-Dibromo-3-chloropropane	ug/kg	25 U
N	SW8260C	1,2-Dibromoethane	ug/kg	2.5 U
N	SW8260C	1,2-Dichlorobenzene	ug/kg	2.5 U
N	SW8260C	1,2-Dichloroethane	ug/kg	2.5 U
N	SW8260C	1,2-Dichloropropane	ug/kg	2.5 U
N	SW8260C	1,3,5-Trimethylbenzene	ug/kg	2.5 U
N	SW8260C	1,3-Dichlorobenzene	ug/kg	2.5 U
N	SW8260C	1,3-Dichloropropane	ug/kg	2.5 U
N	SW8260C	1,4-Dichlorobenzene	ug/kg	2.5 U
N N	SW8260C SW8260C	1,4-Dioxane 2,2-Dichloropropane	ug/kg	250 U 2.5 U
N N	SW8260C	2,4,4-Trimethyl-1-pentene	ug/kg ug/kg	2.5 U
N	SW8260C	2,4,4-Trimethyl-2-pentene	ug/kg ug/kg	5 U
N	SW8260C	2-Butanone	ug/kg	25 U
N	SW8260C	2-Chlorotoluene	ug/kg	2.5 U
N	SW8260C	2-Hexanone	ug/kg	25 U
N	SW8260C	4-Chlorotoluene	ug/kg	2.5 U
N	SW8260C	4-iso-Propyltoluene	ug/kg	2.5 U
N	SW8260C	4-Methyl-2-pentanone	ug/kg	25 U
N	SW8260C	Acetic acid, methyl ester	ug/kg	50 U
N	SW8260C	Acetone	ug/kg	250 UJ
N	SW8260C	Benzene	ug/kg	2.5 U
N N	SW8260C SW8260C	Bromobenzene Bromochloromethane	ug/kg ug/kg	2.5 U 2.5 U
N	SW8260C	Bromodichloromethane	ug/kg ug/kg	2.5 U
N	SW8260C	Bromoform	ug/kg ug/kg	2.5 U
N	SW8260C	Bromomethane	ug/kg	5 U
N	SW8260C	Butane, 2-methoxy-2-methyl-	ug/kg	2.5 U
N	SW8260C	Carbon disulfide	ug/kg	2.5 U
N	SW8260C	Carbon tetrachloride	ug/kg	2.5 U
N	SW8260C	Chlorobenzene	ug/kg	2.5 U
N	SW8260C	Chlorodibromomethane	ug/kg	2.5 U
N	SW8260C	Chloroethane	ug/kg	5 U
N	SW8260C	Chloroform	ug/kg	2.5 U
N	SW8260C	Chloromethane	ug/kg	5 U
N N	SW8260C	Cis-1,2-Dichloroethene	ug/kg	2.5 U
N N	SW8260C SW8260C	cis-1,3-Dichloropropene Cyclohexane	ug/kg ug/kg	2.5 U 25 U
N N	SW8260C	Dibromomethane	ug/kg ug/kg	2.5 U
N	SW8260C	Dichlorodifluoromethane	ug/kg ug/kg	5 U
N	SW8260C	Diethyl ether	ug/kg	2.5 U
N	SW8260C	Ethyl benzene	ug/kg	2.5 U
N	SW8260C	Ethyl-t-Butyl Ether	ug/kg	2.5 U
N	SW8260C	Hexachlorobutadiene	ug/kg	2.5 U
N	SW8260C	Isopropyl ether	ug/kg	2.5 U
N	SW8260C	Isopropylbenzene	ug/kg	2.5 U
N	SW8260C	Methyl cyclohexane	ug/kg	2.5 U
N	SW8260C	Methyl Tertbutyl Ether	ug/kg	2.5 U
N	SW8260C	Methylene chloride	ug/kg	10 U
N	SW8260C	n-Butylbenzene	ug/kg	2.5 U
N N	SW8260C SW8260C	Naphthalene Propylbenzene	ug/kg ug/kg	25 U 2.5 U
N N	SW8260C SW8260C	sec-Butylbenzene	ug/kg ug/kg	2.5 U 2.5 U
N	SW8260C	Styrene	ug/kg ug/kg	2.5 U

		Loc Name	EDSD/SW7	
			Field Sample ID	OC-SD-EDSD/SW7-XXX
			Field Sample Date	06/18/12
			QC Code	FS
_			ple Delivery Group	360-41203-1
Frac	Method	Analyte	Units	Result Qual
N	SW8260C	tert-Butylbenzene	ug/kg	2.5 U
N N	SW8260C	Tetrachloroethene Tetrahydrofuran	ug/kg	2.5 U 50 U
N N	SW8260C SW8260C	Toluene	ug/kg ug/kg	2.5 U
N	SW8260C SW8260C	trans-1,2-Dichloroethene		2.5 U
N	SW8260C	trans-1,3-Dichloropropene	ug/kg ug/kg	2.5 U
N	SW8260C	Trichloroethene	ug/kg ug/kg	2.5 U
N	SW8260C	Trichlorofluoromethane	ug/kg ug/kg	2.5 U
N	SW8260C	Vinyl chloride	ug/kg ug/kg	2.5 U
N	SW8260C	Xylene, o	ug/kg ug/kg	2.5 U
N	SW8260C	Xylenes (m&p)	ug/kg	5 U
N	SW8270	1,2,4,5-Tetrachlorobenzene	ug/kg ug/kg	600 U
N	SW8270	1,2,4-Trichlorobenzene	ug/kg	600 U
N	SW8270	1,2-Dichlorobenzene	ug/kg	600 U
N	SW8270	1,3-Dichlorobenzene	ug/kg	600 U
N	SW8270	1,4-Dichlorobenzene	ug/kg	600 U
N	SW8270	1-Methylnaphthalene	ug/kg ug/kg	600 U
N	SW8270	2,3,4,6-Tetrachlorophenol	ug/kg ug/kg	600 U
N	SW8270	2,4,5-Trichlorophenol	ug/kg ug/kg	600 U
N	SW8270	2,4,6-Trichlorophenol	ug/kg ug/kg	600 U
N	SW8270	2,4-Dichlorophenol	ug/kg ug/kg	600 U
N	SW8270	2,4-Dimethylphenol	ug/kg	600 U
N	SW8270	2,4-Dinitrophenol	ug/kg	600 U
N	SW8270	2,4-Dinitrophenol	ug/kg	600 U
N	SW8270	2.6-Dinitrotoluene	ug/kg	600 U
N	SW8270	2-Chloronaphthalene	ug/kg	600 U
N	SW8270	2-Chlorophenol	ug/kg	600 U
N	SW8270	2-Methylnaphthalene	ug/kg	600 U
N	SW8270	2-Methylphenol	ug/kg	600 U
N	SW8270	2-Nitroaniline	ug/kg	3000 U
N	SW8270	2-Nitrophenol	ug/kg	600 U
N	SW8270	3 & 4 Methylphenol	ug/kg	600 U
N	SW8270	3,3`-Dichlorobenzidine	ug/kg	1200 U
N	SW8270	3-Nitroaniline	ug/kg	3000 U
N	SW8270	4,6-Dinitro-2-methylphenol	ug/kg	3000 U
N	SW8270	4-Bromophenyl phenyl ether	ug/kg	600 U
N	SW8270	4-Chloro-3-methylphenol	ug/kg	1200 U
N	SW8270	4-Chloroaniline	ug/kg	1200 U
N	SW8270	4-Chlorophenyl phenyl ether	ug/kg	600 U
N	SW8270	4-Nitroaniline	ug/kg	3000 U
N	SW8270	4-Nitrophenol	ug/kg	3000 U
N	SW8270	Acenaphthene	ug/kg	600 U
N	SW8270	Acenaphthylene	ug/kg	600 U
N	SW8270	Acetophenone	ug/kg	600 U
N	SW8270	Aniline	ug/kg	600 UJ
N	SW8270	Anthracene	ug/kg	600 U
N	SW8270	Atrazine	ug/kg	600 U
N	SW8270	Azobenzene	ug/kg	600 U
N	SW8270	Benzaldehyde	ug/kg	600 U
N	SW8270	Benzo(a)anthracene	ug/kg	630 J
N	SW8270	Benzo(a)pyrene	ug/kg	670
N	SW8270	Benzo(b)fluoranthene	ug/kg	1000 J
N	SW8270	Benzo(ghi)perylene	ug/kg	540 J
N	SW8270	Benzo(k)fluoranthene	ug/kg	450 J
N	SW8270	Benzoic Acid	ug/kg	3000 U
N	SW8270	Benzyl alcohol	ug/kg	1200 U
N	SW8270	Biphenyl	ug/kg	600 U
N	SW8270	Bis(2-Chloroethoxy)methane	ug/kg	600 U
N	SW8270	Bis(2-Chloroethyl)ether	ug/kg	600 U
N	SW8270	Bis(2-Chloroisopropyl)ether	ug/kg	600 U
N	SW8270	Bis(2-Ethylhexyl)phthalate	ug/kg	1500
N	SW8270	Butylbenzylphthalate	ug/kg	600 U
N	SW8270	Caprolactam	ug/kg	600 U
N	SW8270	Carbazole	ug/kg	600 U
N	SW8270	Chrysene	ug/kg	1000
N	SW8270	Di-n-butylphthalate	ug/kg	1200 U

		EDED/OWZ		
			Loc Name Field Sample ID	EDSD/SW7 OC-SD-EDSD/SW7-XXX
			Field Sample Date	06/18/12
			QC Code	06/16/12 FS
		l ah Sa	mple Delivery Group	360-41203-1
Frac	Method	Analyte	Units	Result Qual
N	SW8270	Di-n-octylphthalate	ug/kg	600 U
N	SW8270	Dibenz(a,h)anthracene	ug/kg	600 U
N	SW8270	Dibenzofuran	ug/kg	600 U
N	SW8270	Diethylphthalate	ug/kg	600 U
N	SW8270	Dimethylphthalate	ug/kg	600 U
N	SW8270	Diphenyl ether	ug/kg	600 U
N	SW8270	Diphenylamine	ug/kg	600 U
N	SW8270	Diphenylmethanone	ug/kg	600 U
N	SW8270	Fluoranthene	ug/kg	1800 J
N	SW8270	Fluorene	ug/kg	600 U
N	SW8270	Hexachlorobenzene	ug/kg	600 U
N	SW8270	Hexachlorobutadiene	ug/kg	600 U
N	SW8270	Hexachlorocyclopentadiene	ug/kg	1200 U
N	SW8270	Hexachloroethane	ug/kg	600 U
N	SW8270	Indeno(1,2,3-cd)pyrene	ug/kg	480 J
N N	SW8270	Isophorone	ug/kg	600 U 600 U
N N	SW8270 SW8270	N-Nitrosodi-n-propylamine	ug/kg	
N N	SW8270 SW8270	N-Nitrosodimethylamine	ug/kg	120 U 600 U
N N	SW8270 SW8270	N-Nitrosodiphenylamine Naphthalene	ug/kg ug/kg	600 U
N	SW8270 SW8270	Nitrobenzene	ug/kg ug/kg	600 U
N	SW8270	Pentachlorophenol	ug/kg ug/kg	600 U
N	SW8270	Phenanthrene	ug/kg ug/kg	640
N	SW8270	Phenol	ug/kg	600 U
N	SW8270	Pyrene	ug/kg	1100
Т	SW6010	Aluminum	mg/kg	5900
Т	SW6010	Antimony	mg/kg	4
Т	SW6010	Arsenic	mg/kg	57
Т	SW6010	Barium	mg/kg	140
Т	SW6010	Beryllium	mg/kg	0.2 J
Т	SW6010	Cadmium	mg/kg	0.84
Т	SW6010	Calcium	mg/kg	1500
Т	SW6010	Chromium	mg/kg	39
Т	SW6010	Cobalt	mg/kg	7.2
Т	SW6010	Copper	mg/kg	270
Т	SW6010	Iron	mg/kg	41000
Т	SW6010	Lead	mg/kg	340
T	SW6010	Magnesium	mg/kg	3300
T	SW6010	Manganese	mg/kg	230
T T	SW6010 SW6010	Nickel	mg/kg mg/kg	19
T T	SW6010 SW6010	Potassium Selenium	mg/kg mg/kg	290 J 1.2 U
T T	SW6010	Silver	mg/kg	2.6
T T	SW6010	Sodium	mg/kg	180 J
l'	SW6010	Thallium	mg/kg	2.5 U
T T	SW6010	Tin	mg/kg	12 U
T	SW6010	Vanadium	mg/kg	16
T T	SW6010	Zinc	mg/kg	450
T	SW7471A	Mercury	mg/kg	0.04 J
N	E300	Bromide	mg/kg	24 U
N	E300	Chloride	mg/kg	55
N	E300	Nitrate as N	mg/kg	6 U
N	E300	Nitrite as N	mg/kg	1.2 U
N	LACH_107_06_1_I	ENitrogen, as Ammonia	mg/kg	10
N	E160.3	Percent Moisture	percent	18
N	E160.3	Percent Solids	percent	82
N	E300	Sulfate	mg/kg	48 U
N	Lloyd Kahn	Total Organic Carbon	mg/kg	8800
N	SW8315	Acetaldehyde	ug/kg	240 UJ
N	SW8315	Formaldehyde	ug/kg	720
N	LC65	Phthalic Acid/Phthalic anhydri	de ug/kg	120 U

Operable Unit 2 June 2012 Surface Water and Sediment Sampling Event **Olin Chemical Superfund Site** Wilmington, Massachusetts

			Loc Name	EDSD/S	SW7
			Field Sample ID	OC-SD-EDSD	/SW7-XXX
			Field Sample Date	06/18/	12
			QC Code	FS	
		Lab S	Sample Delivery Group	360-412	03-1
Frac	Method	Analyte	Units	Result	Qual
		Lab S	Sample Delivery Group	13172	39
N	SW8315A MOD	Hydrazine	ng/g	1.4 J	
N	SW8315A MOD	Monomethylhydrazine (MMI	H) ng/g	5.9 U	
Ν	SW8315A MOD	UDMH	ng/g	5.9 U	
		Lab S	Sample Delivery Group	WIL-2	26
Ν	SW8033M	Dimethylformamide	mg/kg	0.21 U	

Notes:

N = normal

FS = field sample

U = not detected, value is the detection limit

J = value is estimated

ug/kg = microgram per kilogram mg/kg = milligram per kilogram Prepared by / Date: KJC 10/25/12 ng/g = nanogram per gram Checked by / Date: CSR 10/31/12

Table 2 - Surface Water Results Final Results Summary Data Validation Report

	Loc Name EDSD/SW7					
			Field Sample ID	OC-SW-EDSD/SW7-XXX		
		F	ield Sample Date	06/18/12		
			QC Code	FS		
		Lab Samp	le Delivery Group	360-41200-1		
Frac	Method	Analyte	Units	Result Qual		
N	SW8260C	1,1,1,2-Tetrachloroethane	ug/l	1 U		
N	SW8260C	1,1,1-Trichloroethane	ug/l	1 U		
N	SW8260C	1,1,2,2-Tetrachloroethane	ug/l	0.5 U		
N	SW8260C	1,1,2-Trichloro-1,2,2-Trifluoroetha	ne ug/l	1 U		
N	SW8260C	1,1,2-Trichloroethane	ug/l	1 U		
N	SW8260C	1,1-Dichloroethane	ug/l	1 U		
N	SW8260C	1,1-Dichloroethene	ug/l	1 U		
N	SW8260C	1,1-Dichloropropene	ug/l	1 U		
N	SW8260C	1,2,3-Trichlorobenzene	ug/l	1 U		
N	SW8260C	1,2,3-Trichloropropane	ug/l	1 UJ		
N	SW8260C	1,2,4-Trichlorobenzene	ug/l	1 U		
N	SW8260C	1,2,4-Trimethylbenzene	ug/l	1 U		
N	SW8260C	1,2-Dibromo-3-chloropropane	ug/l	5 U		
N	SW8260C	1,2-Dibromoethane	ug/l	1 U		
N	SW8260C	1,2-Dichlorobenzene	ug/l	1 U		
N	SW8260C	1,2-Dichloroethane	ug/l	1 U		
N	SW8260C	1,2-Dichloropropane	ug/l	1 U		
N	SW8260C	1,3,5-Trimethylbenzene	ug/l	1 U		
N	SW8260C	1,3-Dichlorobenzene	ug/l	1 U		
N	SW8260C	1,3-Dichloropropane	ug/l	1 U		
N	SW8260C	1,4-Dichlorobenzene	ug/l	1 U		
N	SW8260C	1,4-Dioxane	ug/l	50 U		
N	SW8260C	2,2-Dichloropropane	ug/l	1 U		
N	SW8260C	2,4,4-Trimethyl-1-pentene	ug/l	1 U		
N	SW8260C	2,4,4-Trimethyl-2-pentene	ug/l	1 U		
N	SW8260C	2-Butanone	ug/l	10 U		
N	SW8260C	2-Chlorotoluene	ug/l	1 U		
N	SW8260C	2-Hexanone	ug/l	10 U		
N	SW8260C	4-Chlorotoluene	ug/l	10 U		
N	SW8260C	4-iso-Propyltoluene	ug/l	1 U		
N	SW8260C	4-Methyl-2-pentanone	_	10 U		
	SW8260C	* *	ug/l	20 U		
N N		Acetic acid, methyl ester	ug/l			
N N	SW8260C	Acetone	ug/l	50 U		
	SW8260C	Benzene	ug/l	1 U		
N	SW8260C	Bromobenzene	ug/l	1 U		
N N	SW8260C	Bromochloromethane	ug/l	1 U		
N N	SW8260C	Bromodichloromethane	ug/l	0.5 U		
N N	SW8260C	Bromoform	ug/l	1 U		
	SW8260C	Bromomethane	ug/l	2 U		
N N	SW8260C	Butane, 2-methoxy-2-methyl- Carbon disulfide	ug/l	5 U		
N N	SW8260C		ug/l	10 U		
N N	SW8260C	Carbon tetrachloride	ug/l	1 U		
N	SW8260C	Chlorobenzene	ug/l	1 U		
N	SW8260C	Chlorodibromomethane	ug/l	0.5 U		
N	SW8260C	Chloroethane	ug/l	2 U		
N	SW8260C	Chloroform	ug/l	1 U		
N	SW8260C	Chloromethane	ug/l	2 U		
N N	SW8260C	Cis-1,2-Dichloroethene	ug/l	1.1		
	SW8260C	cis-1,3-Dichloropropene	ug/l	0.4 U		

Table 2 - Surface Water Results Final Results Summary Data Validation Report

			Loc Name	EDSD/SW7
			Field Sample ID	OC-SW-EDSD/SW7-XXX
			Field Sample Date	06/18/12
			QC Code	FS
		Lab Sa	mple Delivery Group	360-41200-1
Frac	Method	Analyte	Units	Result Qual
N	SW8260C	Dibromomethane	ug/l	1 U
N	SW8260C	Dichlorodifluoromethane	ug/l	1 U
N	SW8260C	Diethyl ether	ug/l	1 U
N	SW8260C	Ethyl benzene	ug/l	1 U
N	SW8260C	Ethyl-t-Butyl Ether	ug/l	5 U
N	SW8260C	Hexachlorobutadiene	ug/l	0.4 U
N	SW8260C	Isopropyl ether	ug/l	10 U
N	SW8260C	Isopropylbenzene	ug/l	1 U
N	SW8260C	Methyl cyclohexane	ug/l	1 U
N	SW8260C	Methyl Tertbutyl Ether	ug/l	1 U
N	SW8260C	Methylene chloride	ug/l	2 U
N	SW8260C	n-Butylbenzene	ug/l	1 U
N	SW8260C	Naphthalene	ug/l	5 U
N	SW8260C	Propylbenzene	ug/l	1 U
N	SW8260C	sec-Butylbenzene	ug/l	1 U
N	SW8260C	Styrene	ug/l	1 U
N	SW8260C	tert-Butylbenzene	ug/l	1 U
N	SW8260C	Tetrachloroethene	ug/l	1 U
N	SW8260C	Tetrahydrofuran	ug/l	10 U
N	SW8260C	Toluene	ug/l	1 U
N	SW8260C	trans-1,2-Dichloroethene	ug/l	1 U
N	SW8260C	trans-1,3-Dichloropropene	ug/l	0.4 U
N	SW8260C	Trichloroethene	ug/l	1 U
N	SW8260C	Trichlorofluoromethane	ug/l	1 U
N	SW8260C	Vinyl chloride	ug/l	0.5 U
N	SW8260C	Xylene, o	ug/l	1 U
N	SW8260C	Xylenes (m&p)	ug/l	2 U
N	SW8270	1,2,4,5-Tetrachlorobenzene	ug/l	4.7 U
N	SW8270	1-Methylnaphthalene	ug/l	4.7 U
N	SW8270	2,3,4,6-Tetrachlorophenol	ug/l	4.7 U
N	SW8270	2,4,5-Trichlorophenol	ug/l	4.7 U
N	SW8270	2,4,6-Trichlorophenol	-	4.7 U
N N	SW8270	•	ug/l	
N	SW8270	2,4-Dichlorophenol	ug/l	4.7 U
N		2,4-Dimethylphenol 2,4-Dinitrophenol	ug/l	4.7 U 4.7 U
	SW8270	•	ug/l	
N N	SW8270	2,4-Dinitrotoluene	ug/l	4.7 U
	SW8270	2,6-Dinitrotoluene	ug/l	4.7 U
N N	SW8270	2-Chloronaphthalene	ug/l	4.7 U
N N	SW8270	2-Chlorophenol	ug/l	4.7 U 0.94 U
	SW8270	2-Methylnaphthalene	ug/l	
N N	SW8270	2-Methylphenol	ug/l	4.7 U
N N	SW8270	2-Nitroaniline	ug/l	4.7 U
N N	SW8270	2-Nitrophenol	ug/l	4.7 U
N	SW8270	3 & 4 Methylphenol	ug/l	4.7 U
N	SW8270	3,3`-Dichlorobenzidine	ug/l	4.7 U
N	SW8270	3-Nitroaniline	ug/l	4.7 U
N	SW8270	4,6-Dinitro-2-methylphenol	ug/l	4.7 U
N	SW8270	4-Bromophenyl phenyl ether	ug/l	4.7 U
N	SW8270 SW8270	4-Chloro-3-methylphenol 4-Chloroaniline	ug/l ug/l	4.7 U 4.7 U

Table 2 - Surface Water Results Final Results Summary Data Validation Report

			Loc Name	EDSD/SW7				
			Field Sample ID					
			Field Sample Date					
			QC Code	FS				
		Lab Sa	mple Delivery Group					
Frac	Method	Analyte	Units	Result Qual				
N	SW8270	4-Chlorophenyl phenyl ether	ug/l	4.7 U				
N	SW8270	4-Nitroaniline	ug/l	4.7 U				
N	SW8270	4-Nitrophenol	ug/l	4.7 U				
N	SW8270	Acenaphthene	ug/l	0.94 U				
N	SW8270	Acenaphthylene	ug/l	0.28 U				
N	SW8270	Acetophenone	ug/l	4.7 U				
N	SW8270	Aniline	ug/l	4.7 UJ				
N	SW8270	Anthracene	ug/l	0.94 U				
N	SW8270	Atrazine	ug/l	4.7 U				
N	SW8270	Azobenzene	ug/l	4.7 U				
N	SW8270	Benzaldehyde	ug/l	4.7 U				
N	SW8270	Benzo(a)anthracene	ug/l	0.28 U				
N	SW8270	Benzo(a)pyrene	ug/l	0.19 U				
N	SW8270	Benzo(b)fluoranthene	ug/l	0.28 U				
N	SW8270	Benzo(ghi)perylene	ug/l	0.47 U				
N	SW8270	Benzo(k)fluoranthene	ug/l	0.28 U				
N	SW8270	Benzoic Acid	ug/l	4.7 U				
N	SW8270	Benzyl alcohol	ug/l	9.4 U				
N	SW8270	Biphenyl	ug/l	4.7 U				
N	SW8270	Bis(2-Chloroethoxy)methane	ug/l	4.7 U				
N	SW8270	Bis(2-Chloroethyl)ether	ug/l	4.7 U				
N	SW8270	Bis(2-Chloroisopropyl)ether	ug/l	4.7 U				
N	SW8270	Bis(2-Ethylhexyl)phthalate	ug/l	1.9 U				
N	SW8270	Butylbenzylphthalate	ug/l	4.7 U				
N	SW8270	Caprolactam	ug/l	4.7 UJ				
N	SW8270	Carbazole	ug/l	4.7 U				
N	SW8270	Chrysene	ug/l	0.94 U				
N	SW8270	Di-n-butylphthalate	ug/l	4.7 U				
N	SW8270	Di-n-octylphthalate	ug/l	4.7 U				
N	SW8270	Dibenz(a,h)anthracene	ug/l	0.47 U				
N	SW8270	Dibenzofuran	ug/l	4.7 U				
N	SW8270	Diethylphthalate	ug/l	4.7 U				
N	SW8270	Dimethylphthalate	ug/l	4.7 U				
N	SW8270	Diphenyl ether	ug/l	4.7 U				
N	SW8270	Diphenylmethanone	ug/l	4.7 U				
N	SW8270	Fluoranthene	ug/l	0.94 U				
N	SW8270	Fluorene	ug/l	0.94 U				
N	SW8270	Hexachlorobenzene	ug/l	0.94 U				
N	SW8270	Hexachlorocyclopentadiene	ug/l	4.7 U				
N	SW8270	Hexachloroethane	ug/l	2.8 U				
N	SW8270	Indeno(1,2,3-cd)pyrene	ug/l	0.47 U				
N	SW8270	Isophorone	ug/l	4.7 U				
N	SW8270	N-Nitrosodiphenylamine	ug/l	4.7 U				
N	SW8270	Nitrobenzene	ug/l	4.7 U				
N	SW8270	Pentachlorophenol	ug/l	0.94 U				
N	SW8270	Phenanthrene	_	0.94 U				
N N		Phenol	ug/l	4.7 U				
N N	SW8270		ug/l					
	SW8270	Pyrene	ug/l	4.7 U				
N N		12 N-Nitrosodi-n-propylamine 12 N-Nitrosodimethylamine	ng/l ng/l	2 U 8.6				

Table 2 - Surface Water Results Final Results Summary

Data Validation Report

Operable Unit 2 June 2012 Surface Water and Sediment Sampling Event Olin Chemical Superfund Site Wilmington, Massachusetts

			Loc Name	EDSD/S	W7		
			Field Sample ID	OC-SW-EDSD/	SW7-XXX		
			Field Sample Date	06/18/12			
			QC Code	FS			
		Lab	Sample Delivery Group	360-4120	00-1		
Frac	Method	Analyte	Units	Result	Qual		
Т	SW6010	Aluminum	ug/l	120			
Т	SW6010	Antimony	ug/l	6 U			
Т	SW6010	Arsenic	ug/l	7.8 J			
Т	SW6010	Barium	ug/l	40			
Т	SW6010	Beryllium	ug/l	1 U			
Т	SW6010	Cadmium	ug/l	1 U			
Т	SW6010	Calcium	ug/l	38000			
Т	SW6010	Chromium	ug/l	8.7			
Т	SW6010	Cobalt	ug/l	2.2 J			
Т	SW6020	Copper	ug/l	1.9			
Т	SW6010	Iron	ug/l	1700			
Т	SW6020	Lead	ug/l	1.5			
Т	SW6010	Magnesium	ug/l	6100			
Т	SW6010	Manganese	ug/l	910			
Т	SW6010	Nickel	ug/l	3.7 J			
Т	SW6010	Potassium	ug/l	5400			
Т	SW6010	Selenium	ug/l	10 U			
Т	SW6020	Silver	ug/l	0.14			
Т	SW6010	Sodium	ug/l	82000			
Т	SW6010	Thallium	ug/l	10 U			
Т	SW6010	Tin	ug/l	50 U			
Т	SW6010	Vanadium	ug/l	10 U			
Т	SW6010	Zinc	ug/l	21 J			
Т	SW7470A	Mercury	ug/l	0.2 U			
N	E300	Bromide	mg/l	0.11			
N	E300	Chloride	mg/l	140			
N	A2340B	Hardness	mg/l	120			
N	E300	Nitrate as N	mg/l	1.1			
N	E300	Nitrite as N	mg/l	0.1 U			
N	LACH_107_	0 Nitrogen, as Ammonia	mg/l	10			
N	E300	Sulfate	mg/l	70			
N	A5310_TOC	_Total Organic Carbon	mg/l	4.3			
N	A2540D	Total Suspended Solids	mg/l	12			
		Lab	Sample Delivery Group	131683	39		
N	SW8000B	Kempore (Azodicarbonamio	de) ug/l	1000 U			
N	SW8000B	OPEX	ug/l	100 U.	J		

Notes:

N = normal

FS = field sample

U = not detected, value is the detection limit

J = value is estimated

ug/l = microgram per liter

 ng/l = nanogram per liter
 Prepared by / Date:
 KJC 10/25/12

 mg/l = milligram per liter
 Checked by / Date:
 CSR 10/31/12

Table 3

Data Validation Action Summary Data Validation Report

Operable Unit 2 June 2012 Surface Water and Sediment Sampling Event

Olin Chemical Superfund Site Wilmington, Massachusetts

Sample Delivery	Lab Sample	Analysis			Lab	Lab	Validated	Validation	Validation Reason	Result
Group	ID	Method	Field Sample ID	Parameter Name	Result	Qualifier	Result	Qualifier	Code	Units
360-41200-1	360-41200-1	SW8260C	OC-SW-EDSD/SW7-XXX	1,2,3-Trichloropropane	1	U *	1	UJ	LCS-RPD	ug/l
360-41203-1	360-41203-1	SW8260C	OC-SD-EDSD/SW7-XXX	Acetone	250	U *	250	UJ	LCS-L	ug/kg
360-41200-1	360-41200-1	SW8270	OC-SW-EDSD/SW7-XXX	Aniline	4.7	U *	4.7	UJ	LCS-L	ug/l
360-41200-1	360-41200-1	SW8270	OC-SW-EDSD/SW7-XXX	Caprolactam	4.7	U *	4.7	UJ	LCS-L	ug/l
360-41200-1	360-41200-1	SW8270	OC-SW-EDSD/SW7-XXX	Di-n-butylphthalate	1.1	JB	4.7	U	BL1	ug/l
360-41203-1	360-41203-1	SW8270	OC-SD-EDSD/SW7-XXX	Aniline	600	U *	600	UJ	LCS-L	ug/kg
360-41203-1	360-41203-1	SW8270	OC-SD-EDSD/SW7-XXX	Benzo(a)anthracene	630	*	630	J	LCS-H	ug/kg
360-41203-1	360-41203-1	SW8270	OC-SD-EDSD/SW7-XXX	Benzo(b)fluoranthene	1000	*	1000	J	LCS-H	ug/kg
360-41203-1	360-41203-1	SW8270	OC-SD-EDSD/SW7-XXX	Fluoranthene	1800	*	1800	J	LCS-H	ug/kg
360-41203-1	360-41203-1	SW6010	OC-SD-EDSD/SW7-XXX	Tin	5.5	JВ	12	U	BL1	mg/kg
360-41203-1	360-41203-1	SW8315	OC-SD-EDSD/SW7-XXX	Acetaldehyde	240	U	240	UJ	MS-L	ug/kg
1316839	6693008	SW8000B	OC-SW-EDSD/SW7-XXX	OPEX	100	U	100	UJ	HT	ug/l

Units:

ug/l = microgram per liter ug/kg = microgram per kilogram mg/kg = milligram per kilogram

Validation Qualifier:

U = not detected, value is the detection limit

J = value is estimated

Validation Reason Codes:

BL1 = Method Blank Qualifier
HT = Holding time for prep or analysis exceeded
LCS-H = LCS recovery high
LCS-L = LCS recovery low
LCS-RPD = LCS-LCSD RPD limit exceeded
MS-L = MS and/or MSD recovery low

Prepared by / Date: KJC 10/25/12 Checked by / Date: CSR 10/31/12

Table 4 - Sediment Results

Tentatively Identified Compounds - SVOCs

Data Validation Report

Operable Unit 2 June 2012 Surface Water and Sediment Sampling Event Olin Chemical Superfund Site

Wilmington, Massachusetts

				Sample				Final		Final			Analysis	
SDG	Lab Sample ID	Method	Field Sample ID	Date	CAS#	Analyte	RT	Result	Q	Qualifier	Units	DF	Date	Analysis Time
360-41203-1	360-41203-1	SW8270	OC-SD-EDSD/SW7-XXX	6/18/2012	TIC01	Unknown	13.36	470	TJ	NJ	ug/kg	20	7/2/2012	10:05:00 PM
360-41203-1	360-41203-1	SW8270	OC-SD-EDSD/SW7-XXX	6/18/2012	TIC02	Unknown	13.39	520	TJ	NJ	ug/kg	20	7/2/2012	10:05:00 PM
360-41203-1	360-41203-1	SW8270	OC-SD-EDSD/SW7-XXX	6/18/2012	TIC03	Unknown	13.43	450	TJ	NJ	ug/kg	20	7/2/2012	10:05:00 PM
360-41203-1	360-41203-1	SW8270	OC-SD-EDSD/SW7-XXX	6/18/2012	TIC04	Unknown	13.45	320	TJ	NJ	ug/kg	20	7/2/2012	10:05:00 PM
360-41203-1	360-41203-1	SW8270	OC-SD-EDSD/SW7-XXX	6/18/2012	TIC05	Unknown	13.51	370	TJ	NJ	ug/kg	20	7/2/2012	10:05:00 PM
360-41203-1	360-41203-1	SW8270	OC-SD-EDSD/SW7-XXX	6/18/2012	TIC06	Unknown	13.54	610	TJ	NJ	ug/kg	20	7/2/2012	10:05:00 PM
360-41203-1	360-41203-1	SW8270	OC-SD-EDSD/SW7-XXX	6/18/2012	TIC07	Unknown	13.57	610	TJ	NJ	ug/kg	20	7/2/2012	10:05:00 PM
360-41203-1	360-41203-1	SW8270	OC-SD-EDSD/SW7-XXX	6/18/2012	TIC08	Unknown	13.62	290	TJ	NJ	ug/kg	20	7/2/2012	10:05:00 PM

ug/kg = microgram per kilogram

J = value is estimated

N = presumptively present

T = Tentatively identified compound, the result is estimated

Prepared by / Date:

Checked by / Date: MJW 10/01/12

KJC 07/16/12

Table 4 - Surface Water Results Tentatively Identified Compounds - SVOCs

Data Validation Report

Operable Unit 2 June 2012 Surface Water and Sediment Sampling Event Olin Chemical Superfund Site Wilmington, Massachusetts

				Sample				Final	Final			Analysis	Analysis
SDG	Lab Sample ID	Method	Field Sample ID	Date	CAS#	Analyte	RT	Result Q	Qualifier	Units	DF	Date	Time
360-41200-1	360-41200-1	SW8270	OC-SW-EDSD/SW-7-XXX	6/18/2012	TIC01	Unknown	1.74	58 TJ	NJ	ug/l	1	6/20/2012	8:15:00 PM
360-41200-1	360-41200-1	SW8270	OC-SW-EDSD/SW-7-XXX	6/18/2012	TIC02	Unknown	10.05	0.43 TJ	NJ	ug/l	1	6/20/2012	8:15:00 PM
360-41200-1	360-41200-1	SW8270	OC-SW-EDSD/SW-7-XXX	6/18/2012	100-23-2	Benzenamine, N,N-dimethyl-4-nitro-	12.44	1.2 TJN	NJ	ug/l	1	6/20/2012	8:15:00 PM
360-41200-1	360-41200-1	SW8270	OC-SW-EDSD/SW-7-XXX	6/18/2012	TIC03	Unknown	14.64	0.63 TJ	NJ	ug/l	1	6/20/2012	8:15:00 PM
360-41200-1	360-41200-1	SW8270	OC-SW-EDSD/SW-7-XXX	6/18/2012	TIC04	Unknown	14.67	1.5 TJ	NJ	ug/l	1	6/20/2012	8:15:00 PM
360-41200-1	360-41200-1	SW8270	OC-SW-EDSD/SW-7-XXX	6/18/2012	TIC05	Unknown	14.77	1.8 TJ	NJ	ug/l	1	6/20/2012	8:15:00 PM
360-41200-1	360-41200-1	SW8270	OC-SW-EDSD/SW-7-XXX	6/18/2012	TIC06	Unknown	15.38	1.6 TJ	NJ	ug/l	1	6/20/2012	8:15:00 PM
360-41200-1	360-41200-1	SW8270	OC-SW-EDSD/SW-7-XXX	6/18/2012	111-76-2	Ethanol, 2-butoxy-	5.81	0.67 TJN	NJ	ug/l	1	6/20/2012	8:15:00 PM

ug/l = microgram per liter

J = value is estimated

N = presumptively present

T = Tentatively identified compound, the result is estimated

Prepared by / Date: KJC 08/08/12

Checked by / Date: MJW 10/01/12

CHECKLISTS



FILE COPY

ANALYTICAL REPORT

Job Number: 360-41200-1

SDG Number: 360-41200-1

Job Description: Olin Chemical Superfund Site SW

For:

Olin Corporation PO BOX 248 Charleston, TN 37310-0248

Attention: Mr. James Cashwell

Dann Jen

Approved for release. James T Wickham Technology Manager 7/27/2012 2:47 PM

Designee for
Becky C Mason
Project Manager II
becky.mason@testamericainc.com
07/27/2012

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all NELAC requirements for accredited parameters, exceptions are noted in this report. Pursuant to NELAC, this report may not be reproduced except in full, and with written approval from the laboratory. TestAmerica Westfield Certifications and Approvals: MADEP MA014, RIDOH57, CTDPH 0494, VT DECWSD, NELAP NH DES 2539, NELAP NY 10843, NY ELAP 10843, North Carolina 647. Field sampling is performed under SOPs WE-FLD-001 and WE-FLD-002.







FILE COPY

ANALYTICAL REPORT

Job Number: 360-41203-1

SDG Number: 360-41203-1

Job Description: Olin Chemical Superfund Site

For:

Olin Corporation PO BOX 248 Charleston, TN 37310-0248

Attention: Mr. James Cashwell

Approved for release Chris F Reynolds QA Manager 7/11/2012 8:50 AM

Designee for
Becky C Mason
Project Manager II
becky.mason@testamericainc.com
07/11/2012

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all NELAC requirements for accredited parameters, exceptions are noted in this report. Pursuant to NELAC, this report may not be reproduced except in full, and with written approval from the laboratory. TestAmerica Westfield Certifications and Approvals: MADEP MA014, RIDOH57, CTDPH 0494, VT DECWSD, NELAP NH DES 2539, NELAP NY 10843, NY ELAP 10843, North Carolina 647. Field sampling is performed under SOPs WE-FLD-001 and WE-FLD-002.

CHECKED FOR COMPLETENESS OF PARAMETERS ORDERED BY:

TestAmerica Laboratories, Inc.

TestAmerica Westfield Westfield Executive Park, 53 Southampton Road, Westfield, MA 01085 Tel (413) 572-4000 Fax (413) 572-3707 www.testamericainc.com



OLIN CORPORATION RI ANALYTICAL - WILMINGTON SDG: WIL-26 SF3645



KATAHDIN ANALYTICAL SERVICES, INC. 600 TECHNOLOGY WAY SCARBOROUGH, ME 04074



2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax: 717-656-2681 • www.lancasterlabs.com

Type I Data Package

Prepared for:

Olin Corporation Suite 200 3855 North Ocoee Street Cleveland TN 37312

Project: Olin Wilmington, MA / 6107120016 Sediment Sample Collected on 06/18/12

SDG# OLN78

GROUP SAMPLE NUMBERS 1317239 6695248

PA Cert. # 36-00037 NY Cert. # 10670 NJ Cert. # PA011 NC Cert. # 521

TX Cert. # T104704194-08A-TX

Through our technical processes and second person review of data, we have established that our data/deliverables are in compliance with the methods and project requirements unless otherwise noted or previously resolved with the client.

Authorized by:

Dana M. Kauffman Manager

Lana on Karyfman.

Date: 07/05/2012

CHECKED FOR COMPLETENESS OF PARAMETERS ORDERED BY:

Any questions or concerns you might have regarding this data package should be directed to your client representative, Nicole Maljovec at Ext. 1537.

Version 1.3, Oct 2011

LEVEL I DATA QUALITY EVALUATION **OLIN-WILMINGTON**

STANDARD OPERATING PROCEDURE AND CHECKLIST Lab Report # 360-4/203 Project# 6107120016 VOLATILE ORGANICS BY METHOD SW8260B/624 い。生か

Reviewer/Date MIKE WASHELL Sr.Review/Date

Where the QAPP does Activities." MADEP, D Date Dynly Note: The following analyses will be evaluated according to the "MADEP OA/OC Guidelines for Sampling.

	however, may not list QA/QC criteria for every chemical analysis. Where not defined by MADEP, criteria will default to values stipulated in the QAPP. Where the (not define criteria, QA/QC requirements will default to limits employed by the laboratory.	win be evaluated teria for every ch ements will defau	emical analysis. Who lt to limits employed	ere not defined by M. I by the laboratory.	ADEP, criteria	ampung, Da will default to	nta Evanuatio o values stipu	on and keporting a lated in the QAPP. V	Activities. Where the (
1.0	Laboratory Deliverable Requirements	ments							
	1.1 Laboratory Information : Was all of the following provided in the laboratory report? Check items received.	as all of the follo	owing provided in t	he laboratory report?	Yes	No	N/A	Comments:	
	☐ Name of Laboratory ☐ Client Information: ☐	☐ Address [☐ Name	☐ Project ID ☐ Address	☐ Phone # □	□ Sample untact (ID	identification	☐ Sample identification – Field and Laboratory (IDs must be cross-referenced)	-aboratory	
ACTI	lab for su	ission of missin	ng or illegible information.						
	1.2 Laboratory Report Certification Statement	ification Staten	nent		Yes [\(\text{No} \) 1	No []	N/A []	Comments:	
	Does the laboratory report include a completed Analytical Report Certification in the required format?	ude a complete	d Analytical Repon	t Certification in the	required form	at?]		
ACTI	ACTION: If no, contact lab for submission of missing	sion of missing c	certification or certii	certification or certification with correct format.	format.				
	1.3 Laboratory Case Narrative:	ive:			Yes [] No []		N/A [_]	Comments:	
	EV Narrative serves as an exception report for the project and method QA/QC performance.	ption report for th	e project and methoc	d QA/QC performanc		Y Narrative includes an	s an explanat	D Narrative includes an explanation of each discrepancy on the	ncy on the
	;					ממוסון סומוסון			

ACTION: If no, contact lab for submission of missing or illegible information.

Yes [No [] 1.4 Chain of Custody (COC) copy present with all documentation completed?

Comments:

N/A[]

Does the laboratory report include completed Chain of Custody forms containing all samples in this SDG?

NOTE: Olin receives and maintains the original COC.

ACTION: If no, contact lab for submission of copy of completed COC.

1.5 Sample Receipt Information (Cooler Receipt Form present?):

STANDARD OPERATING PROCEDURE AND CHECKLIST VOLATILE ORGANICS BY METHOD SW8260B/624 OLIN-WILMINGTON LEVEL I DATA QUALITY EVALUATION

Yes [No [N/A	Comments:
Were each of the following tasks completed and recorded upon receipt of the sample(s) into the laboratory? Sample temperature confirmed: must be 1° – 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply). Container type noted Condition observed Pfield and lab IDs cross referenced	ollection, tempera	ture requirement does not apply).
ACTION: If no, contact lab for submission of missing or incomplete documentation. 1.5.1 Were the correct bottles and preservatives used?		
Water - 40 mL VOA vial/HCL to pH<2, cool to 4°C Soil - 5 gram Encore TM /cool to 4°C or 40 mL VOA vial with field preservation of sodium bisulfate (low-level) or methanol (high-level) or field preservation in water if soils are reactive to sodium bisulfate (i.e. alkaline conditions, excessive humic acid content, etc.)	N/A [Comments:
ACTION: If no, inform senior chemist. Document justification for change in container/volume (if applicable); qualify both positive data and non-detect data (J) if cooler temperature exceeds 10°C. Rejection of data requires professional judgment	le); qualify both	1 positive data and non-detect data (J) if
ACTION: If each VOA vial for a sample contains air bubbles or the VOA vial analyzed contained air bubbles, flag positives (J) and reject nondetects (R).	s, flag positives	(J) and reject nondetects (R).
1.5.2 Were all samples delivered to the laboratory without breakage? No \square	N/A[_]	Comments:
1.5.3 Does the Cooler Receipt Form or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the Yes [] No [] quality of the data?	N/A[Comments:
1.6 Sample Results Section: Was the following information supplied in the laboratory $ { m Yes} [] $ No $[] $		Comments:
Field ID and Lab ID Date and time collected Characterian method Chara	D—% n on/extraction/dige rted in dry weight	☐ Dilution Factor ☐ ☐ moisture or solids ☐ Reporting limits ☐ Date of preparation/extraction/digestion clean-up and analysis, where applicable is (soils must be reported in dry weight)
1.7 QA/QC Information: Was the following information provided in the laboratory report Yes \ \sqrt{No} \ \sqrt{lo} \ \text{for each sample batch?}	N/A[_]	Comments:

国 Method blank results 国LCS recoveries 竹 MS/MSD recoveries and RPDs 国 Surrogate recoveries	
ACTION: If no, contact lab for submission of missing or incomplete information.	
2.0 Holding Times	
Have any technical holding times, determined from date of collection to date of analysis, been exceeded?	N/A Comments:
For water samples, the holding time is 7 days (aromatics) from sampling for unpreserved samples and 14 days for preserved samples.	
For soil samples, the holding time is 14 days from sampling if field preserved with sodium bisulfate/methanol/or water. If an Encore TM sampler was used, the lab must <i>preserve</i> the sample within 48 hours. Analytical holding time from time of preservation is 14 days.	
NOTE: List samples that exceed hold time with # of days exceeded on checklist	
ACTION: If technical holding times are exceeded, qualify all positive results (J) and non-detects (UJ). For water samples that are grossly exceeded (>2X hold time) reject (R) all non-detect results. For soil samples professional judgement will be used to determine if rejection is necessary.	t are grossly exceeded (>2X hold time) reject (R) all non-
3.0 Laboratory Method	
3.1 Was the correct laboratory method used? Purge and Trap Water: 5030B Soil: 5035 Volatile Organics 8260B	N/A [] Comments:
ACTION: If no, contact lab to provide justification for method change compared to the requested method. Contact senior chemist to inform Client of change or to request variance.	ist to inform Client of change or to request variance.
3.2 Are the practical quantitation limits the same as those specified by the Yes \square No \square SOW \square QAPP \square Lab \square MADEP	N/A [] Comments:

Evaluate PQLs with respect to sample matrix, preparation, dilution, moisture, etc. If sample PQL is indeterminate, contact lab for explanation. Provide a listing of all samples with PQLs that are elevated due to dilution, sample matrix, or preparation factors.

OLIN-WILMINGTON LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST

VOLATILE ORGANIC COMPOUNDS BY METHOD \$260B/624	Y METHOD 8260F	3/624		
3.3 Are the appropriate parameter results present for each sample in the SDG?	Yes [\(\sqrt{\sqrt{No}}\)	N/A	Comments:	
NOTE: The MADEP QA/QC Guidelines requires a minimum compound reporting list for volatile organic compounds. Determine target compound requirement and verify reporting list.				
3.4 Were Tentatively Identified Compounds (TICs) reported?	Yes [No [] N/A	Comments:	
NOTE: TICs are only required for samples with full MADEP target list. Determine if TICs are required. MADEP requires that all TICs be reported to the LCS. Per the MADEP guidance, TICs, which are identified as aliphatic hydrocarbons, do not have to be reported as TICs. However, these compounds must be evaluated as part of the health-based risk assessment approach (VPH/EPH).	V612	1 Sentified	Ą	
ACTION: Qualify reported TIC results as estimated and flag (NJ).				
3.5 If dilutions were required, were dilution factors reported?	Yes No [] N/A	Comments:	
NOTE: MADEP guidance states that if a diluted and an undiluted analysis is performed, the laboratory should report results for the lowest dilution within the valid calibration range for each analyte.				
ACTION: If no, contact the lab for submission.				
4.0 Method Blanks				
4.1 Are the Method Blank Summaries present?	Yes No	N/A	Comments:	
ACTION: If no, call the laboratory for submission of missing data.				
4.2 Was a method blank analyzed for each analytical batch of 20 samples or less?	Yes No] N/A	Comments:	

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4.3 Is the method blank less than the PQL? (See attached table for PQLs).	Yes [Ñ	N/A [_]	Comments:	
containments (accione, metrylene cinoride ons < 5x the PQL.) e results for VOC parameters? Qualify data	Yes	No [N	N/A	Comments:	
For the common contaminants (methylene chloride, acetone, toluene, and 2-butanone):					
If the sample concentration is $< 10 \times \text{blank}$ value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.					
If the sample concentration is $> 10 \times \text{blank}$ value, no qualification is needed.					
For other VOC contaminants:					
If the sample concentration is $< 5 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.					
If the sample concentration is $> 5 \times \text{blank}$ value, no qualification is needed.					

ACTION: If any blank has positive results, list all the concentrations detected and flagging level (flagging level = 10x or 5 × blank value) on the checklist. List all affected samples and their qualifiers.

5.0 <u>Laboratory Control Standards</u>

Comments: N/A No Was a laboratory control standard (LCS) run with each analytical batch of 20 Yes samples or less? 5.1

ACTION: If no, call laboratory for LCS form submittal. If data is not available, use professional judgment to determine qualification actions for data associated with that batch.

STANDARD OPERATING PROCEDURE AND CHECKLIST VOLATILE ORGANIC COMPOUNDS BY METHOD 8260B/624 LEVEL I DATA QUALITY EVALUATION **OLIN-WILMINGTON**

5.2 Is a LCS Summary Form present?	Yes [No	N/A	Comments:	
ACTION: If no, contact lab for resubmission of missing data.					
5.2 Is the recovery of any analyte outside of control limits?	Yes [No [N/A	Comments:	
NOTE: A <u>full</u> target, second source LCS is required by MADEP.	4	Ace bue	70/27	27	
NOTE: Use MADEP guidelines list LCS recovery limits of 70-130. Recovery limits are 40-160% for acetone, MEK, 4-methyl-2-pentanone, 2-hexanone, dichlorodifluoromethane, bromomethane, chloromethane and 1,4-Dioxane.					
ACTION: If recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit but > 10%, qualify all positive and nodetect results within the batch as (J). If LCS recovery is <10%, non-detect results are rejected (R). Document qualified compounds and percent recoveries in the validation report.	s (J). If recc cument quali	overy is belo fied compou	w the lower li	mit but > 10%, qualify a	ull positive and no- ation report.
5.4 Are 80% of LCS recoveries within laboratory control limits?	Yes [i/	Yes 🗹 No 🗌	N/A	Comments:	
ACTION: If 80% of LCS recoveries are not within limits, use professional judgment and consult Senior Chemist.					
6.0 Matrix Spikes					
trix s ior cl	sk specific	schedules.	Confirm sp	Confirm spike requirements for each set with the	each set with the
6.1 Were project-specific MS/MSDs collected? List project samples that were spiked. ACTION: If no, contact senior chemist to see if any were specified.	Yes [No [N/A []	Comments:	
6.2 Is the MS/MSD Recovery Form present? ACTION: If no, contact lab for resubmission of missing data.	Yes [] No []	No	N/A	Comments:	

Yes No No N/A Comments:			Yes $[]$ No $[]$ N/A $[\checkmark]$ Comments:	Where: SSR = Spiked sample resul	
ž			ž		
icy of 1 per 20 samples per	ACTION: If any matrix spike data is missing, call lab for resubmission.	6.4 Are any VOC spike recoveries outside of the QC limits?	Yes	NOTE: $\%R = (\underline{SSR-SR}) \times 100\%$ SA	SA = Spike added

NOTE: A full target, second source MS/MSD is required by MADEP.

NOTE: MADEP guidelines list MS/MSD recovery limits as 70-130.

NOTES: 1) If only one of the recoveries for an MS/MSD pair is outside of the control limits, no qualification is necessary. Use professional judgment for the MS/MSD flags. 2) If the MS/MSD was performed by the laboratory on a non-project sample, no qualification is required. ACTION: MS/MSD flags only apply to the sample spiked. If the recoveries of the MS and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit, qualify both positive results and non-detects (J). If recovery is < 10%, reject non-detects (R)

Comments: $N/A[\sqrt{}]$ No [Yes [] 6.5 Are any RPDs for MS/MSD recoveries outside of the QA/QC limits? NOTE: RPD = S - D x 100% Where S = MS result (S + D)/2 D = MSD res

ACTION: If the RPD exceeds the control limit, qualify positive results and non-detects (J).

NOTE: MADEP guidelines list MS/MSD RPD limit for water is < 20 and soils is < 30.

LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST VOLATILE ORGANIC COMPOUNDS BY METHOD \$260B/624	
7.0 Surrogate Recoveries	
Were one or more VOC surrogate recoveries outside of laboratory limits for any Yes [] No [\sum NA [] Comments: sample or method blank? If yes, were samples re-analyzed?	omments:
NOTE: ${}^{\circ}$ R = QD x 100% Where: S = MS sample result D = MSD sample result	
NOTE: No qualification is required if two of the surrogates are within acceptable QC limits. If surrogate recoveries fail due to dilution, results are not flagged. Document on checklist and in the case narrative.	
NOTE: MADEP guidelines list surrogate limits for both water and soils as 70-130%. Surrogate recovery limits greater than ± 30% are allowed for difficult matrices (wastes, sludges, etc.) with appropriate analytical documentation.	
ACTION: If recoveries are >10%, but fail to meet quality control criteria: (1) For recoveries below the QC limit but >10%, qualify nondetects and positives (J), and (2) For recoveries above the QC limit, qualify only positives (J). If any surrogate recovery is <10% (unless the QC limits are below 10%, in which case, results are flagged as stated above), flag positives (J) and reject nondetects (R).	fy nondetects and positives (J), and ow 10%, in which case, results are
8.0 Sampling Accuracy	
8.1 Were trip blanks shipped with VOC samples and analyzed? NOTE: MADEP requires trip blanks per the following frequency: Soil/Sediment Aqueous Drinking Water	omments:
red amples	
8.2 Do any trip blanks have positive results? Yes \square No \square N/A \square Comments:	omments:
ACTION: Prepare a list of samples shipped in the same cooler as a contaminated blank.	

If the sample concentration is < 5 × blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is $> 5 \times \text{blank}$ value, no qualification is needed.

The majority of ground water samples are collected directly from a tap, process stream, Yes Lor with dedicated tubing. Rinse blanks will not be collected.	No [] N/A [✓ Comments:	
8.3 Were rinsate blanks collected? Prior to evaluating rinsate blanks, obtain a list of the associated samples from the senior chemist.		
NOTE: MADEP does not specify the collection of rinsate blanks.		
$8.4~\mathrm{Do}$ any rinsate blanks have positive results?	Yes No No Comments:	
ACTION: Evaluate rinsate results against blank results to determine if contaminant may be laboratory-, ambient-, or shipment-derived. If results are not lab-, ambient-, or shipment-related, qualify according to the table above (8.2).	ooratory-, ambient-, or shipment-derived.	If results are not lab-,
9.0 Field Duplicates		
9.1 Were field duplicate samples collected? Obtain a list of samples and their associated Yes [] No [✓ N/A [] Comments:	
9.2 Were field duplicates collected per the required frequency?] No [_] N/A [_] Comments:	
☐ SOW ☐ QAPP (1 per 10) ☐ MADEP Option 1(1 per 20)		
□ MADEP Option 3 (1 per 10)		

Olin Level 1 - 8260B-Revised Oct 2011.doc

VOLATILE ORGANIC COMPOUNDS BY METHOD 8260B/624 STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION OLIN-WILMINGTON

	9.3 Was the RPD \leq 50% for soils or 30% for waters? Calculate the RPD for all results and attach to this review.	Yes [No	Yes \[\] No \[\] N/A \[\]	Comments:	
ACTI	ACTION: Qualify data (J) for both sample results if the RPD goal is exceeded.					
10.0	Application of Validation Qualifiers					
	Was any of the data qualified?	Yes [V]	$\operatorname{Yes}[V]$ No	N/A []	Comments:	
	If so, apply data qualifiers directly to the DQE copy of laboratory report and flag pages for entry in database.					

REFERENCES

- LAW, 1999, "Final Quality Assurance Project Plan, Olin Wilmington Property, 51 Eames Street, Wilmington, MA", LAW Engineering and Environmental Services, Kennesaw, GA 30144. August 1999.
- STL-Westfield, 2002. "Olin General Chemistry Control Limits (Soil & Water)," Severn Trent Laboratories, Inc., 53 Southampton Road, Westfield, MA, 01085.
- U.S. Environmental Protection Agency (USEPA), 1996. "Region 1 EPA-NE Data Validation Guidelines For Evaluating Environmental Analyses"; Quality Assurance Unit Staff; Office of Environmental Measurement and Evaluation; December 1996.
- "Compendium of Quality Control Requirements and Performance Standards for Selected Analytical Protocols, "WSC-CAM #10-320, Final, Revision No. 1, 5 July 2010. MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup,
- MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data in Support of Action Conducted Under the Massachusetts Contingency Plan (MCP)," WSC-CAM, Section VIIA, Final, Revision No. 1, 1

Client: Olin Corporation

Job Number: 360-41203-1

Sdg Number: 360-41203-1

Lab Control Sample/

Lab Control Sample Duplicate Recovery Report - Batch: 360-92619

Method: 8260C Preparation: 5035

LCS Lab Sample ID:

LCS 360-92619/1-A

Analysis Batch:

360-92620

Instrument ID:

HP #1 GC/MS

Client Matrix:

Solid

Prep Batch:

360-92619

Lab File ID:

V56955-LCS.d

Dilution:

1.0

Leach Batch:

N/A Initial Weight/Volume: 5 g

Analysis Date:

07/02/2012 1625

Units:

Prep Date:

07/02/2012 1527

ug/Kg

Final Weight/Volume:

5 g

Leach Date:

N/A

LCSD Lab Sample ID: LCSD 360-92619/2-A

Client Matrix:

Solid

07/02/2012 1648

Units:

360-92620 360-92619 Instrument ID: Lab File ID:

HP #1 GC/MS V56956.D

Dilution:

1.0

Prep Batch: Leach Batch:

Analysis Batch:

N/A ug/Kg Initial Weight/Volume:

Final Weight/Volume:

5 g 5 g

Analysis Date: Prep Date:

07/02/2012 1527

Leach Date:

N/A

		<u>% Rec.</u>					
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
1,1,1,2-Tetrachloroethane	110	113	70 - 130	2	20		
1,1,1-Trichloroethane	90	93	70 - 130	3	20		
1,1,2,2-Tetrachloroethane	111	114	70 - 130	3	20		
1,1,2-Trichloroethane	82	86	70 - 130	5	20		
1,1-Dichloroethane	90	93	70 - 130	3	20		
1,1-Dichloroethene	93	91	70 - 130	2	20		
1,2,3-Trichloropropane	110	115	70 - 130	4	20		
1,2,3-Trichlorobenzene	117	117	70 - 130	0	20		
1,2,4-Trichlorobenzene	118	120	70 - 130	2	20		
1,2-Dichlorobenzene	111	117	70 - 130	5	20		
1,2-Dichloroethane	89	91	70 - 130	2	20		
1,3,5-Trimethylbenzene	109	114	70 - 130	4	20		
1,3-Dichlorobenzene	113	116	70 - 130	3	20		
1,4-Dichlorobenzene	112	117	70 - 130	4	20		
1,4-Dioxane	100	117	70 - 130	15	20		
2,2-Dichloropropane	82	88	70 - 130	7	20		
2-Chlorotoluene	107	111	70 - 130	4	20		
2-Hexanone	61*	63 •	70 - 130	3	20	*	*
4-Chlorotoluene	108	111	70 - 130	2	20		
Acetone	(36)	(37)	70 - 130	2	20	*	*
Benzene	86	87	70 - 130	0	20		
Bromobenzene	108	109	70 - 130	1	20		
Bromoform	108	112	70 - 130	4	20		
Bromomethane	94	99	70 - 130	6	20		
Carbon disulfide	116	121	70 - 130	4	20		
Carbon tetrachloride	92	94	70 - 130	2	20		
Chlorobenzene	108	109	70 - 130	1	20		
Chlorobromomethane	89	90	70 - 130	1	20		
Chlorodibromomethane	83	84	70 - 130	1	20		
1,2-Dibromo-3-Chloropropane	109	110	70 - 130	1	20		
Chloroethane	83	86	70 - 130	4	20		
Chloroform	89	92	70 - 130	3	20		
Chloromethane	86	89	70 - 130	4	20		
cis-1,2-Dichloroethene	90	90	70 - 130	0	20		
cis-1,3-Dichloropropene	81	83	70 - 130	2	20		
Dibromomethane	89	91	70 - 130	2	20		
	7.7	10/0/					T

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Version 1.3, Oct 2011

LEVEL I DATA QUALITY EVALUATION OLIN-WILMINGTON

STANDARD OPERATING PROCEDURE AND CHECKLIST Lab Report # 360-41200 -VOLATILE ORGANICS BY METHOD SW8260B/624

2/30/12 10 Reviewer/Date Mr Ke Waste Buly Project# 6107120016 Sr.Review/Date

Note: The following analyses will be evaluated according to the "MADEP QA/QC Guidelines for Sampling, Data Evaluation and Reporting Activities." MADEP, e QAPP does

	however, may not list QA/QC criteria for every chemical analysis. Where not defined by MADEP, criteria will default to values stipulated in the QAPP. Where the not define criteria, QA/QC requirements will default to limits employed by the laboratory.) (a)
1.0	<u>Laboratory Deliverable Requirements</u>	
	1.1 Laboratory Information: Was all of the following provided in the laboratory report? Yes [\rightarrow No [] N/A [] Comments: Check items received.	
ACT	□ Name of Laboratory □ Address □ Project ID □ Phone # □ Sample identification – Field and Laboratory Client Information: □ Name □ Address □ Client Contact (IDs must be cross-referenced) ACTION: If no, contact lab for submission of missing or illegible information.	
	1.2 Laboratory Report Certification Statement Yes [No [] N/A [] Comments: Does the laboratory report include a completed Analytical Report Certification in the required format?	
ACT	ACTION: If no, contact lab for submission of missing certification or certification with correct format.	
	1.3 Laboratory Case Narrative:	
	Marrative serves as an exception report for the project and method QA/QC performance. Certification Statement.	Э
ACT	ACTION: If no contact lab for submission of mission or illanible information	

ACTION: If no, contact lab for submission of missing or illegible intormation.

1.4 Chain of Custody (COC) copy present with all documentation completed?

Comments:

Does the laboratory report include completed Chain of Custody forms containing all samples in this SDG?

NOTE: Olin receives and maintains the original COC.

ACTION: If no, contact lab for submission of copy of completed COC.

1.5 Sample Receipt Information (Cooler Receipt Form present?):

Zes [Z	No NA Comments:
Were each of the following tasks completed and recorded upon receipt of the sample(s) into the laboratory? Example temperature confirmed: must be 1° – 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply). Example temperature confirmed: must be 1° – 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply).	ame day as collection, temperature requirement does not apply).
ACTION: If no, contact lab for submission of missing or incomplete documentation. 1.5.1 Were the correct bottles and preservatives used? Water - 40 mL VOA vial/HCL to pH<2, cool to 4°C Soil - 5 gram Encore™/cool to 4°C or 40 mL VOA vial with field preservation of sodium bisulfate (low-level) or methanol (high-level) or field preservation in water if soils are reactive to sodium bisulfate (i.e. alkaline conditions, excessive humic acid content, etc.)	✓ No [] N/A [] Comments:
ACTION: If no, inform senior chemist. Document justification for change in container/volume (if applicable); qualify both positive data and non-detect data (J) if cooler temperature exceeds 10°C. Rejection of data requires professional judgment	(if applicable); qualify both positive data and non-detect data (J) if
ACTION: If each VOA vial for a sample contains air bubbles or the VOA vial analyzed contained air bubbles, flag positives (J) and reject nondetects (R).	l air bubbles, flag positives (J) and reject nondetects (R).
1.5.2 Were all samples delivered to the laboratory without breakage? 1.5.3 Does the Cooler Receipt Form or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the Yes [] quality of the data?	No [] N/A [] Comments: No [Y] N/A [] Comments:
1.6 Sample Results Section: Was the following information supplied in the laboratory $X_{es}[V]$ report for each sample?	No [] N/A [] Comments:
Field ID and Lab ID	Dilution Factor Dilution Factor Dilution Factor Dilution Factor Dilution/extraction/digestion clean-up and analysis, where applicable Units (soils must be reported in dry weight)
1.7 QA/QC Information: Was the following information provided in the laboratory report $Yes [\scalebox{\ensuremath{M}}]$ for each sample batch?	No [] N/A [] Comments:

STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION **OLIN-WILMINGTON**

VOLATILE ORGANIC COMPOUNDS BY METHOD 8260B/624
口 Method blank results
ACTION: If no, contact lab for submission of missing or incomplete information.
2.0 Holding Times
Have any technical holding times, determined from date of collection to date of analysis, Yes [] No [M] Comments:
For water samples, the holding time is 7 days (aromatics) from sampling for unpreserved samples and 14 days for preserved samples.
For soil samples, the holding time is 14 days from sampling if field preserved with sodium bisulfate/methanol/or water. If an $Encore^{TM}$ sampler was used, the lab must preserve the sample within 48 hours. Analytical holding time from time of preservation is 14 days.
NOTE: List samples that exceed hold time with # of days exceeded on checklist
ACTION: If technical holding times are exceeded, qualify all positive results (J) and non-detects (UJ). For water samples that are grossly exceeded (>2X hold time) reject (R) all non-detect results. For soil samples professional judgement will be used to determine if rejection is necessary.
3.0 Laboratory Method
3.1 Was the correct laboratory method used? Purge and Trap Water: 5030B Volatile Organics 8260B Why Late makes makes makes makes makes
ACTION: If no, contact lab to provide justification for method change compared to the requested method. Contact senior chemist to inform Client of change or to request variance.
3.2 Are the practical quantitation limits the same as those specified by the Yes [] N/A [] Comments: \square SOW \square QAPP \square Lab \square MADEP

Evaluate PQLs with respect to sample matrix, preparation, dilution, moisture, etc. If sample PQL is indeterminate, contact lab for explanation. Provide a listing of all samples with PQLs that are elevated due to dilution, sample matrix, or preparation factors.

1/2/p 2/mx

VOLATILE ORGANIC COMPOUNDS BY METHOD 8260B/624 STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION **OLIN-WILMINGTON**

3.3 Are the appropriate parameter results present for each sample in the SDG?	Yes [V]	No	N/A	Comments:	
NOTE: The MADEP QA/QC Guidelines requires a minimum compound reporting list for volatile organic compounds. Determine target compound requirement and verify reporting list.					
3.4 Were Tentatively Identified Compounds (TICs) reported?	Yes [No	N/A	Comments:	
NOTE: TICs are only required for samples with full MADEP target list. Determine if TICs are required. MADEP requires that all TICs be reported to the LCS. Per the MADEP guidance, TICs, which are identified as aliphatic hydrocarbons, do not have to be reported as TICs. However, these compounds must be evaluated as part of the health-based risk assessment approach (VPH/EPH).		₹	now i don't fee s	fee 1	
ACTION: Qualify reported TIC results as estimated and flag (NJ).					
3.5 If dilutions were required, were dilution factors reported?	Yes [V	No	N/A	Comments:	
NOTE: MADEP guidance states that if a diluted and an undiluted analysis is performed, the laboratory should report results for the lowest dilution within the valid calibration range for each analyte.					
ACTION: If no, contact the lab for submission.					
4.0 Method Blanks					
4.1 Are the Method Blank Summaries present?	Yes [V] No []	No	N/A	Comments:	
ACTION: If no, call the laboratory for submission of missing data.					
4.2 Was a method blank analyzed for each analytical batch of 20 samples or less?	Yes [No	N/A	Comments:	

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4.3 Is the method blank less than the PQL? (See attached table for PQLs).	Yes	Yes [No []	N/A[]	Comments:	
NOTE: MADEP allows common laboratory contaminants (acetone, methylene chloride and 2-butanone) to be present at concentrations < 5x the PQL.			•		
4.4 Do any method blanks have positive results for VOC parameters? Qualify data $_{\rm ves}$	Yes	No [N/A []	Comments:	
For the common contaminants (methylene chloride, acetone, toluene, and 2-butanone):					
If the sample concentration is $< 10 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.					
If the sample concentration is $> 10 \times \text{blank}$ value, no qualification is needed.					
For other VOC contaminants:					
If the sample concentration is $< 5 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.					
If the sample concentration is $> 5 \times$ blank value, no qualification is needed.					

ACTION: If any blank has positive results, list all the concentrations detected and flagging level (flagging level = 10x or $5 \times blank$ value) on the checklist. List all affected samples and their qualifiers.

5.0 Laboratory Control Standards

Comments: N/A[_] No Was a laboratory control standard (LCS) run with each analytical batch of 20 Yes samples or less? 5.1

ACTION: If no, call laboratory for LCS form submittal. If data is not available, use professional judgment to determine qualification actions for data associated with that batch.

5.2 Is a LCS Summary Form present?	Yes [No	N/A	Comments:
ACTION: If no, contact lab for resubmission of missing data.				
5.2 Is the recovery of any analyte outside of control limits?	Yes	No [N/A	Comments:
NOTE: A <u>full</u> target, second source LCS is required by MADEP.	R 20	77-	1,2,1	1,2,3-trichlorgrapan
NOTE: Use MADEP guidelines list LCS recovery limits of 70-130. Recovery limits are 40-160% for acetone, MEK, 4-methyl-2-pentanone, 2-hexanone, dichlorodifluoromethane, bromomethane, chloromethane and 1,4-Dioxane.				
ACTION: If recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit but > 10%, qualify all positive and nodetect results within the batch as (J). If LCS recovery is <10%, non-detect results are rejected (R). Document qualified compounds and percent recoveries in the validation report.	as (J). If recov	ery is below ed compoun	the lower lii ds and percer	nit but > 10%, qualify all positive and no- trecoveries in the validation report.
5.4 Are 80% of LCS recoveries within laboratory control limits?	Yes [No	N/A	Comments:
ACTION: If 80% of LCS recoveries are not within limits, use professional judgment and consult Senior Chemist.				
6.0 Matrix Spikes				
Matrix spikes may be collected at different frequencies based on monthly, quarterly, or task specific schedules. senior chemist.	ask specific so		Confirm sp	Confirm spike requirements for each set with the
6.1 Were project-specific MS/MSDs collected? List project samples that were spiked. ACTION: If no, contact senior chemist to see if any were specified.	Yes []	No [V	N/A	Comments:
6.2 Is the MS/MSD Recovery Form present? ACTION: If no, contact lab for resubmission of missing data.	Yes [] oN	N/A [V]	Comments:

			Spiked sample result SR = Sample result	1
Comments:		Comments:	SSR =	
Yes ☐ No ☐ N/A [✓ Comments:		Yes No No NA NA Comments:	Where:	
No [No		
Yes []		Yes		
6.3 Were matrix spikes analyzed at the required frequency of 1 per 20 samples per matrix?	ACTION: It any matrix spike data is missing, call lab for resubmission. 6.4 Are any VOC spike recoveries outside of the OC limits?		NOTE: $\%R = (\underline{SSR-SR}) \times 100\%$ SA	SA = Spike added

NOTE: A full target, second source MS/MSD is required by MADEP.

NOTE: MADEP guidelines list MS/MSD recovery limits as 70-130.

NOTES: 1) If only one of the recoveries for an MS/MSD pair is outside of the control limits, no qualification is necessary. Use professional judgment for the MS/MSD flags. 2) If the MS/MSD was performed by the laboratory on a non-project sample, no qualification is required. ACTION: MS/MSD flags only apply to the sample spiked. If the recoveries of the MS and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit, qualify both positive results and non-detects (J). If recovery is < 10%, reject non-detects (R)

Comments: N/A [5 No Yes [6.5 Are any RPDs for MS/MSD recoveries outside of the QA/QC limits? D = MSD result**NOTE:** RPD = $\frac{S - D}{(S + D)/2}$ x 100% Where S = MS result D = MSD res

NOTE: MADEP guidelines list MS/MSD RPD limit for water is \leq 20 and soils is \leq 30.

ACTION: If the RPD exceeds the control limit, qualify positive results and non-detects (J).

LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST VOLATILE ORGANIC COMPOUNDS BY METHOD 8260B/624	CEDURE AND CHECKLIST OUNDS BY METHOD 8260B/624
7.0 Surrogate Recoveries	
Were one or more VOC surrogate recoveries outside of laboratory limits for any sample or method blank? If yes, were samples re-analyzed?	for any Yes [] No [\sqrt{N/A} [] Comments:
NOTE: $\%R = QD \times 100\%$ Where: S = MS sample D = MSD sample result	result
NOTE: No qualification is required if two of the surrogates are within acceptable QC limits. If surrogate recoveries fail due to dilution, results are not flagged. Document on checklist and in the case narrative.	uble QC ment on
NOTE: MADEP guidelines list surrogate limits for both water and soils as 70-130%. Surrogate recovery limits greater than \pm 30% are allowed for difficult matrices (wastes, sludges, etc.) with appropriate analytical documentation.	7-130%. wastes,
ACTION: If recoveries are >10%, but fail to meet quality control criteria: (1) For recoveries below the QC limit but >10%, qualify nondetects and positives (J), and (2) For recoveries above the QC limit, qualify only positives (J). If any surrogate recovery is <10% (unless the QC limits are below 10%, in which case, results are flagged as stated above), flag positives (J) and reject nondetects (R).	recoveries below the QC limit but >10%, qualify nondetects and positives (J), and recovery is <10% (unless the QC limits are below 10%, in which case, results are
8.0 Sampling Accuracy	
8.1 Were trip blanks shipped with VOC samples and analyzed? NOTE: MADEP requires trip blanks per the following frequency: Soil/Sediment Anneous	Yes [] No [] N/A [] Comments:
1 Not Required ples 1 per 10 samples	
8.2 Do any trip blanks have positive results?	Yes $[]$ No $[]$ N/A $[]$ Comments:
ACTION: Prepare a list of samples shipped in the same cooler as a contaminated blank.	olank.

LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST VOLATILE ORGANIC COMPOUNDS BY METHOD 8260B/624 **OLIN-WILMINGTON**

If the sample concentration is < 5 × blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL	the concentration r	eported if gre	ater than the F	OT.	
If the sample concentration is $> 5 \times \text{blank}$ value, no qualification is needed.					
The majority of ground water samples are collected directly from a tap, process stream, or with dedicated tubing. Rinse blanks will not be collected.	am, Yes ∐	Ş, o, Z,	N/A[_]	Comments:	
8.3 Were rinsate blanks collected? Prior to evaluating rinsate blanks, obtain a list of the associated samples from the senior chemist.	iated				
NOTE : MADEP does not specify the collection of rinsate blanks.					
8.4 Do any rinsate blanks have positive results?	Yes	No [N/A [V	Comments:	
ACTION: Evaluate rinsate results against blank results to determine if contaminant may be laboratory-, ambient-, or shipment-related, qualify according to the table above (8.2).	t may be labora	tory-, ambie	ent-, or shipi		If results are not lab-,
9.0 Field Duplicates					
9.1 Were field duplicate samples collected? Obtain a list of samples and their associated field duplicates.	iated Yes	No.	N/A[_]	Comments:	
9.2 Were field duplicates collected per the required frequency?	Yes	Š	N/A [Comments:	
☐ SOW ☐ QAPP (1 per 10) ☐ MADEP Option 1(1 per 20)		•			
□ MADEP Option 3 (1 per 10)					

ACTION: Qualify data (J) for both sample results if the RPD goal is exceeded.

10.0 Application of Validation Qualifiers

N/A[] No [$\text{Yes}[\checkmark]$ Was any of the data qualified?

Comments:

If so, apply data qualifiers directly to the DQE copy of laboratory report and **flag pages** for entry in database.

REFERENCES

- LAW, 1999, "Final Quality Assurance Project Plan, Olin Wilmington Property, 51 Eames Street, Wilmington, MA", LAW Engineering and Environmental Services, Kennesaw, GA 30144. August 1999.
- STL-Westfield, 2002. "Olin General Chemistry Control Limits (Soil & Water)," Severn Trent Laboratories, Inc., 53 Southampton Road, Westfield, MA, 01085.
- U.S. Environmental Protection Agency (USEPA), 1996. "Region 1 EPA-NE Data Validation Guidelines For Evaluating Environmental Analyses"; Quality Assurance Unit Staff; Office of Environmental Measurement and Evaluation; December 1996.
- "Compendium of Quality Control Requirements and Performance Standards for Selected Analytical Protocols," WSC-CAM #10-320, Final, Revision No. 1, 5 July 2010. MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup,
- MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data in Support of Action Conducted Under the Massachusetts Contingency Plan (MCP)," WSC-CAM, Section VIIA, Final, Revision No. 1, 1

Quality Control Results

Client: Olin Corporation

Job Number: 360-41200-1

Sdg Number: 360-41200-1

Lab Control Sample/

Lab Control Sample Duplicate Recovery Report - Batch: 360-92562

Method: 8260C Preparation: 5030C

LCS Lab Sample ID:

LCS 360-92562/3

Analysis Batch:

360-92562

Instrument ID:

HP #3 GC/MS

Client Matrix:

Water

Prep Batch:

N/A

Lab File ID:

V20092.D

Dilution: Analysis Date: 1.0

Leach Batch:

Units:

N/A ug/L Initial Weight/Volume:

5 mL

Prep Date:

06/29/2012 1358 06/29/2012 1358

Final Weight/Volume:

5 mL

Leach Date:

LCSD Lab Sample ID: LCSD 360-92562/4 Analysis Batch:

360-92562

Instrument ID:

HP #3 GC/MS

Client Matrix: Dilution:

Water

Prep Batch:

N/A N/A Lab File ID:

V20093.D

Analysis Date:

1.0

Leach Batch:

ug/L

Initial Weight/Volume:

5 mL

Prep Date:

06/29/2012 1424 06/29/2012 1424

Units:

Final Weight/Volume:

5 mL

Leach Date:

N/A

	9	<u> 6 Rec.</u>					
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
1,1,1,2-Tetrachloroethane	97	95	70 - 130	3	20		
1,1,1-Trichloroethane	88	80	70 - 130	10	20		
1,1,2,2-Tetrachloroethane	84	84	70 - 130	1	20		
1,1,2-Trichloroethane	95	91	70 - 130	4	20		
1,1-Dichloroethane	91	85	70 - 130	7	20		
1,1-Dichloroethene	92	85	70 - 130	9	20		
1,1-Dichloropropene	87	79	70 - 130	10	20		
1,2,3-Trichlorobenzene	87	90	70 - 130	3_	20		
1,2,3-Trichloropropane	83	103	70 - 130	22	20		*
1,2,4-Trichlorobenzene	79	80	70 - 130	1	20		
1,2,4-Trimethylbenzene	85	78	70 - 130	8	20		
1,2-Dibromo-3-Chloropropane	78	85	70 - 130	8	20		
1,2-Dichlorobenzene	86	85	70 - 130	1	20		
1,2-Dichloroethane	88	84	70 - 130	4	20		
1,2-Dichloropropane	83	77	70 - 130	8	20		
1,3,5-Trimethylbenzene	85	79	70 - 130	8	20		
1,3-Dichlorobenzene	90	88	70 - 130	2	20		
1,3-Dichloropropane	88	86	70 - 130	3	20		
1,4-Dichlorobenzene	88	84	70 - 130	4	20		
1,4-Dioxane	85	89	70 - 130	5	20		
2,2-Dichloropropane	87	81	70 - 130	8	20		
2-Butanone (MEK)	63	64	70 - 130	1	20	*	*
2-Chlorotoluene	82	78	70 - 130	5	20		
2-Hexanone	99	99	70 - 130	0	20		
4-Chlorotoluene	82	81	70 - 130	1	20		
4-Isopropyltoluene	84	78	70 - 130	7	20		
4-Methyl-2-pentanone (MIBK)	82	81	70 - 130	1	20		
Acetone	93	92	70 - 130	0	20		
Benzene	90	84	70 - 130	6	20		
Bromobenzene	76	74	70 - 130	3	20		
Bromoform	74	74	70 - 130	0	20		
Bromomethane	99	90	70 - 130	10	20		
Carbon disulfide	117	105	70 - 130	11	20		
Carbon tetrachloride	100	90	70 - 130	11	20		
Chlorobenzene	87	86	70 - 130	1	20		
Chlorobromomethane	89	86	70 - 130	3	20		

Version 1.3, Oct 2011

Sr. Reviewer/Date Mysylfsylv 9/5/12

Sr. Review/Date Chris C. coulds 10/31/12

Lab Report # 260 - 40 41200

Project # 6104120018

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1.1 Laboratory Information : Was all of the following provided in the laboratory report? Yes [V] Check items received.	on: Was all of the	following provided in the	laboratory report?	Yes [No	N/A	Comments:
E Name of Laboratory Client Information:	☑ Address ☑ Name	Project ID	☐ Phone #	☐ Sampl tact (e identificat 'Ds must be	ole identification – Field and Lab (IDs must be cross-referenced)	[D/ Sample identification – Field and Laboratory act (IDs must be cross-referenced)
ACTION: If no, contact lab for submission of missing or illegible information.	submission of mis	ssing or illegible inforn	nation.				
1.2 Laboratory Report Certification Statement	Certification Sta	tement		Yes [No I I N/A I I	No I	NA I	Comments:
	e a completed Ana	alytical Report Certifica	ion in the required	format?]]	
ACTION: If no, contact lab for submission of missing certification or certification with correct format.	ıbmission of missi	ng certification or certifi	cation with correct t	ormat.			
1.3 Laboratory Case Narrative:	larrative:			Yes [V]	No []	Yes [No [] N/A []	Comments:
☐ Narrative serves as an exception report for the project and method QA/QC performance.	eption report for the	project and method QA/C	lC performance.	☐ Marrativ	e includes a	ın explanatio	☐ Marrative includes an explanation of each discrepancy on the
ACTION: If no, contact lab for submission of missing or illegible information.	ıbmission of missi	ng or illegible informatic	n.		Certification	Certification Statement.	
1.4 Chain of Custody (COC) copy present		of completed COC?		Yes	No [] N/A []	N/A	Comments:
Does the laboratory report include a copy of the completed Chain of Custody forms containing all samples in this SDG?	copy of the comp	leted Chain of Custody f	orms containing all				

NOTE: Olin receives and maintains the original COC.

	es not apply).								E Dilution Factor
Comments:	ature requirement doe		Comments:			Comments:	Comments:	Comments:	Ale % moisture or solids ction/digestion clean-up and try weight)
N/A	ction, temper		N/A[_]	¥		N/A	N/A	N/A	がす
Yes [No [N/A []	e day as colle ferenced		No[] N/A[]			No	No.		n Factor preparation/ st be reported
	on the same IDs cross re		Yes [Yes [C	Yes	Yes	Dilution Factor Date of prepara
1.5 Sample Receipt Information (Cooler Receipt Form): Were each of the following tasks completed and recorded upon receipt of the sample(s) into the laboratory?	Sample temperature confirmed: must be 1° - 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply). Container type noted Condition observed PpH verified (where applicable) Pfield and lab IDs cross referenced	ACTION: If no, contact lab for submission of missing or incomplete documentation.	Were the correct bottles and preservatives used?	Water - 1 Liter amber bottle/cool to 4° C Soil - 8 oz soil jar/cool to 4° C	ACTION: If no, inform senior chemist. Document justification for change in container/volume (if applicable), qualify positive and non-detect data (J) if cooler temperature exceeds 10°C. Rejection of data requires professional judgment.	Were all samples delivered to the laboratory without breakage?	Does the Cooler Receipt Form or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data?	1.6 Sample Results Section: Was the following information supplied in the laboratory $\mathbf{Yes}[\]$ No $[\]$	ID C Date and time collected C Analyst Initials C Analysis method C Preparation method C Target analytes and concentrations
1.5 Sa tasks c	✓ Sample tem✓ Container ty	ACTION: If n	1.5.1		ACTION: container/vc temperature	1.5.2	1.5.3	1.6 \$	Field ID and Lab ID Clean-up method Matrix

ACTION: If no, contact lab for submission of missing or incomplete information.

STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625 LEVEL I DATA QUALITY EVALUATION **OLIN-WILMINGTON**

1.7 QA/QC Information: Was the following information provided in the laboratory report Yes [] No [] N/A [] Comments: for each sample batch? Method blank results ELCS recoveries MT MS/MSD recoveries and RPDs Expression Surrogate recoveries
ACTION: If no, contact lab for submission of missing or incomplete information.
2.0 Holding Times Yes [] No [] Comments:
Have any technical holding times, determined from date of collection to date of analysis, been exceeded?
NOTE: For water samples, the holding time is 7 days from sampling to extraction and 40 days from extraction to analysis. For soil samples, the holding time is 14 days from sampling to extraction and 40 days from extraction to analysis.
ACTION: If technical holding times are exceeded, qualify all positive results (J) and non-detects (UJ). For water samples that are grossly exceeded (>2X hold time) reject (R) all non-detect results. For soil samples professional judgement will be used to determine if rejection is necessary.
3.0 Laboratory Method Comments:
3.1 Was the correct laboratory method used?
Water Extraction 3510C or 3520C Soil Extraction 3540C or 3550B Semi-volatile Organics 8270C D Most carrect
ACTION: If no, contact project manager to inform Client of change; request variance from Client; contact laboratory to provide justification for method change compared to the requested method.
3.2 Are the practical quantitation limits the same as those specified by the Norland Norland Comments:

ACTION: If no, evaluate change with respect to sample matrix, preparation, dilution, moisture, etc. If sample PQL is indeterminate, contact lab for explanation.

NOTE: The QAPP and MADEP QA/QC Guidelines provides PQLs for semi-volatile organic

Verify proper PQLs were used for each data set.

compounds.

	LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625	ALUATIO E AND CE IETHOD 8	N ECKLIST 270C/625		
3.3	Are the appropriate parameter results present for each sample in the SDG?	Yes	No	N/A[_]	Comments:
ACTION: If no	ACTION: If no, check Request for Analysis to verify if method was ordered and COC to verify that it was sent, and contact lab for resubmission of the missing data	was sent, an	d contact la	b for resubmi	ssion of the missing data
3.4	Were Tentatively Identified Compounds (TICs) reported?	Yes [V) No	N/A[]	Comments:
NOTE TICS are requirec guidance, T reported as based risk a	NOTE TICs are only required for samples with full MADEP target list. Determine if TICs are required. MADEP requires that all TICs be reported to the LCS. Per the MADEP guidance, TICs, which are identified as aliphatic hydrocarbons, do not have to be reported as TICs. However, these compounds must be evaluated as part of the health-based risk assessment approach (VPH/EPH).				
ACTION: Q	ACTION: Qualify reported TIC results as estimated and flag (NJ).				
3.5	If dilutions were required, were dilution factors reported?	Yes [V]	No No	N/A []	Comments:
ACTION: If m	ACTION: If no, contact the lab for submission.				
4.0 Meth	Method Blanks				
4.1	Is the Method Blank Summary present?				
ACTION:	ACTION: If no, call the laboratory for submission of missing data.	Yes	o N	N/A	Comments:
4.2	For the analysis of SVOCs, has a method blank been analyzed for each analysis batch of field samples of 20 or less?	Yes [No	Yes [\(\sqrt{No} \] N/A []	Comments:
ACTION: justification.	If no, document discrepancy in case narrative and contact lab for consult senior chemist for action needed.				

LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625	4.3 Is the method blank less than the PQL?	** MADEP allows common laboratory contaminants (such as phthalates) to be
	4.3	٧

present at concentrations < 5x the PQL NOTE:

Acetophenone - o.67 Sx: 3,35 Do any method blanks have positive results for SVOC parameters? Qualify data Yes [No [] N/A [] Comments: For the common contaminants (phthalates): according to the following:

If the sample concentration is $< 10 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is $> 10 \times \text{blank}$ value, no qualification is needed.

Di-n-butyl phthelate - 1.16 10x=11.6

For other SVOC contaminants:

If the sample concentration is $< 5 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is $> 5 \times$ blank value, no qualification is needed.

ACTION: For any blank with positive results, list all contaminants for each method blank, including the concentration detected and the flagging level (flagging level = 5x or 10x the blank value) and the associated samples and qualifiers.

Laboratory Control Standard 5.0

Was a laboratory control standard run with each analytical batch of 20 Yes [No [NA [] Comments: samples or less? 5.1

ACTION: Call laboratory for LCS form submittal. If data are not available, use professional judgment to determine the usability of sample results associated with that batch.

STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625	RE AND CHECKLIST METHOD 8270C/625
5.2 Is a LCS Summary Form present?	Yes [No [] N/A [] Comments:
ACTION: If no, contact lab for resubmission of missing data.	
5.3 Is the recovery of any analyte outside of control limits?	Variable Mark 1 M/A 1 1 Comment
NOTE: A <u>full</u> target, second source LCS is required by MADEP.	res No NA Comments:
NOTE: MADEP guidelines list LCS recovery limits as 40-140 for base-neutral compounds and 30-130 for the acid compounds. The following compounds must exhibit percent recoveries between 15-140%: 4-chloroaniline, 4-nitrophenol, phenol, and 2,4-dinitrophenol. The laboratory must identify analytes that routinely exceed these limits.	Cuprolactan-33/32
ACTION: If recovery is above the upper limit, qualify all positive sample results within the batch a	sample results within the batch as (J). If recovery is below the lower limit but > 10%, qualify all positive and no-

Yes [No No N/A Comments: ACTION: If 80% of LCS recoveries are not within limits, use professional judgment detect results within the batch as (J). If LCS recovery is <10%, non-detect results are rejected (R). Are 80% of LCS recoveries within laboratory control limits? and consult Senior Chemist. 5.4

Matrix Spikes 0.9

Matrix spikes may be collected at different frequencies based on monthly, quarterly, or task specific schedules. Confirm spike requirements for each set with the senior chemist.

	6.1 Wes were spiked.	Were project specified MS/MSDs collected? List project samples that piked.	Yes [No [N/A []	Yes [] No [] N/A [] Comments:
ACTIC	ı JI :NC	ACTION: If no, contact senior chemist to see if any were specified.				
-	6.2	Is the MS/MSD recovery form present?	Ves	No I	N/A I	Vec 1 No 1 N/A Comments:
ACTI	ON: I	ACTION: If no, contact lab for resubmission of missing data.	3			
-	6.3	Were matrix spikes analyzed at the required frequency of 1 per 20 $$ Yes $$ No $$ No $$ N/A $$ Comments:	Yes [No	N/A	Comments:
ACTI	ON: I	ACTION: If any matrix spike data are missing, call lab for resubmission.				

LEVEL I DATA QUALITY EVALUATION OLIN-WILMINGTON

	STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625	E AND CH	ECKLIST 70C/625	-	
6.4	6.4 Are any SVOC spike recoveries outside of the QC limits?	Ves [-]	No.	N/A [V	Yes [] No [] N/A [V Comments:
NOTE	NOTE: $\%$ R = $(SSR-SR)$ x 100% Where: SSR = Spiked sample result]		

SA = Spike added

SR = Sample result

NOTE: MADEP guidelines list MS/MSD recovery limits as 40-140 for base-neutral NOTE: A full target, second source MS/MSD is required by MADEP.

NOTES: 1) If only one of the recoveries for an MS/MSD pair is outside of the control limits, no qualification is necessary. Use professional judgment for the MS/MSD flags.

compounds and 30-130 for acid compounds.

2) If the MS/MSD was performed by the laboratory on a non-project sample, no qualification is required. ACTION: MS/MSD flags only apply to the sample spiked. If the recoveries of the MS and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit, qualify both positive results and nondetects (J). If LCS recovery is <10%, non-detect results are rejected (R).

6.5 Are any RPDs for MS/MSD re	LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625 Are any RPDs for MS/MSD recoveries outside of the QC limits? Yes No No	VALUATION RE AND CHECKLIST METHOD 8270C/625 Yes \[\begin{array}{c c c c c c c c c c c c c c c c c c c
NOTE: RPD = $\frac{\text{S-D}}{(\text{S+D})/2}$ x 100%	Where: $S = MS$ sample result $D = MSD$ sample result	
NOTE: MADEP guidelines list MS/MSD RPD limits for water as \leq 20 and soils as \leq 30.	limits for water as ≤ 20 and soils as ≤ 30 .	

ACTION: If the RPD exceeds the control limit, qualify positive results and non-detects

the data are evaluated, but no flags are applied.

NOTE: Laboratory control limits apply when spiked sample results fall within the normal calibration range. If dilutions are required due to high sample concentrations,

Were one or more SVOC surrogate recoveries outside of laboratory limits for any Yes Mold NA Comments: Surrogate Recoveries 7.0

sample or method blank? If yes, were samples re-analyzed?

NOTE:
$$%R = QD \times 100\%$$
 Where: S = MS sample result D = MSD sample result

NOTE: MADEP guidelines list surrogate limits for soils as 30-130% for all surrogates, and for water as 30-130% for base-neutrals and 15-110% for acid surrogates.

NOTE: Qualify BNE results based upon BNE surrogates and AE results based upon AE surrogates.

ACTION: If recoveries are >10%, but 2 or more from any one fraction (acid or baseneutral) fail to meet QC criteria: (1) For recoveries below the QC limit, qualify nondetects and positives (J), and (2) For recoveries above the QC limit, qualify only positives (J). If any surrogate recovery is <10% (unless the lab QC limits are below

STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625 LEVEL I DATA QUALITY EVALUATION OLIN-WILMINGTON

10%, in which case, results are flagged as stated above), flag positives (J) and reject non-detects (R).

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	Yes No I		Yes [] No []		
The majority of ground water samples are collected directly from a tap, process stream, or with dedicated tubing. Rinse blanks will not be collected.	8.1 Were rinsate blanks collected? Prior to evaluating rinsate blanks, obtain a list of the associated samples from the project chemist.	NOTE: MADEP does not specify the collection of rinsate blanks.	8.2 Do any rinsate blanks have positive results?	NOTE: For the common contaminants (phthalates), qualification is applied as indicated above using a 10x blank value in lieu of a 5x blank value.	If the sample concentration is $< 5 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

N/A [] Comments:

Comments:

Field Duplicates

9.0

If the sample concentration is $> 5 \times \text{blank}$ value, no qualification is needed.

9.1 Were field duplicate samples collected? Obtain a list of the samples and Yes [] No [Y N/A [] Comments: their associated field duplicates.		
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attach

ACTION: RPD must be ≤50% for soil and water. Qualify data (J) for both sample results if the RPD exceeds 50%.

10.0 Application of Validation Qualifiers

Comments: Yes [No NA [] Was any of the data qualified?

If so, apply data qualifiers directly to the DQE copy of laboratory report and **flag pages** for entry in database.

REFERENCES

LAW, 1999, 'Final Quality Assurance Project Plan, Olin Wilmington Property, 51 Eames Street, Wilmington, MA", LAW Engineering and Environmental Services, Kennesaw, GA 30144. August 1999.

STL-Westfield, 2002. "Olin - General Chemistry Control Limits (Soil & Water)," Severn Trent Laboratories, Inc., 53 Southampton Road, Westfield, MA, 01085.

U.S. Environmental Protection Agency (USEPA), 1996. "Region 1 EPA-NE Data Validation Guidelines For Evaluating Environmental Analyses"; Quality Assurance Unit Staff; Office of Environmental Measurement and Evaluation; December 1996 MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Compendium of Quality Control Requirements and Performance Standards for Selected Analytical Protocols," WSC-CAM #10-320, Final, Revision No. 1, 1 July 2010.

MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data in Support of Action Conducted Under the Massachusetts Contingency Plan (MCP)," WSC-CAM, Section VIIA, Final, Revision No. 1, 1

Quality Control Results

Client: Olin Corporation

Job Number: 360-41200-1

Sdg Number: 360-41200-1

Lab Control Sample/

Lab Control Sample Duplicate Recovery Report - Batch: 360-92116

Method: 8270D

LCS 360-92116/2-A

Preparation: 3510C

LCS Lab Sample ID:

Water

Analysis Batch:

360-92162

Instrument ID:

Inst. B

Client Matrix: Dilution:

1.0

Prep Batch: Leach Batch: 360-92116 Lab File ID: N/A

B17808.D

Analysis Date:

06/20/2012 1705 06/19/2012 1905

Initial Weight/Volume: Final Weight/Volume: 1000 mL 1.0 mL

Prep Date: Leach Date:

N/A

ug/L

Injection Volume:

2 uL

LCSD Lab Sample ID: LCSD 360-92116/3-A

Water

Analysis Batch:

360-92162

Instrument ID:

Inst. B

Client Matrix: Dilution:

1.0

Prep Batch: Leach Batch:

% Rec.

360-92116 N/A

Lab File ID: Initial Weight/Volume: B17809.D 1000 mL

Analysis Date: Prep Date:

06/20/2012 1736 06/19/2012 1905

Units:

Units:

ug/L

Final Weight/Volume: Injection Volume:

1.0 mL

Leach Date:

N/A

2 uL

Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
1,1'-Biphenyl	89	89	40 - 140	1	20		
1,2,4,5-Tetrachlorobenzene	79	79	40 - 140	1	20		
1-Methylnaphthalene	80	79	40 - 140	0	20		
2,2'-oxybis[1-chloropropane]	78	79	40 - 140	1	20		
2,3,4,6-Tetrachlorophenol	89	88	30 - 130	2	20		
2,4,5-Trichlorophenol	96	98	30 - 130	2	20		
2,4,6-Trichlorophenol	97	98	30 - 130	1	20		
2,4-Dichlorophenol	91	93	30 - 130	2	20		
2,4-Dimethylphenol	94	98	30 - 130	4	20		
2,4-Dinitrophenol	59	56	30 - 130	4	20	J	J
2,4-Dinitrotoluene	93	92	40 - 140	1	20		
2,6-Dinitrotoluene	99	99	40 - 140	0	20		
2-Chloronaphthalene	75	75	40 - 140	1	20		
2-Chlorophenol	73	78	30 - 130	5	20		
2-Methylnaphthalene	82	82	40 - 140	0	20		
2-Methylphenol	67	71	30 - 130	5	20		
2-Nitroaniline	100	101	40 - 140	0	20		
2-Nitrophenol	85	84	30 - 130	2	20		
3 & 4 Methylphenol	63	69	30 - 130	9	20		
3,3'-Dichlorobenzidine	92	97	40 - 140	5	20		
3-Nitroaniline	100	101	40 - 140	1	20		
4,6-Dinitro-2-methylphenol	58	56	30 - 130	3	20	J	J
4-Bromophenyl phenyl ether	84	83	40 - 140	1	20		
4-Chloro-3-methylphenol	92	94	30 - 130	2	20		
4-Chloroaniline	72	74	40 - 140	3	20		
4-Chlorophenyl phenyl ether	85	85	40 - 140	0	20		
4-Nitroaniline	116	110	40 - 140	5	20		
4-Nitrophenol	36	37	30 - 130	3	20	J	J
Acenaphthene	80	82	40 - 140	2	20		
Acenaphthylene	84	84	40 - 140	0	20		
Acetephenone	88	90	40 - 140	2	20		
Aniline	39	41	40 - 140	6	20	J *	J
Anthracene	93	93	40 - 140	0	20		
Atrazine	123	122	40 - 140	0	20		
Azobenzene	100	99	40 - 140	1	20		
Benzaldehyde	98	98	40 - 140	0	20		

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Client: Olin Corporation

Job Number: 360-41200-1

Sdg Number: 360-41200-1

Lab Control Sample/

Lab Control Sample Duplicate Recovery Report - Batch: 360-92116

Method: 8270D Preparation: 3510C

LCS Lab Sample ID:

LCS 360-92116/2-A

Analysis Batch:

Instrument ID:

Inst. B

Client Matrix: Dilution:

Water

Prep Batch: Leach Batch: 360-92116 Lab File ID: B17808.D

Analysis Date:

1.0

N/A

Initial Weight/Volume:

1000 mL

Prep Date:

06/20/2012 1705 06/19/2012 1905

Final Weight/Volume:

1.0 mL

Leach Date:

N/A

Injection Volume:

2 uL

LCSD Lab Sample ID: LCSD 360-92116/3-A

Analysis Batch:

360-92162

360-92162

ug/L

Instrument ID:

Inst. B

Client Matrix: Dilution:

Water 1.0

Prep Batch: Leach Batch: 360-92116 N/A

Lab File ID: Initial Weight/Volume: B17809.D 1000 mL

Analysis Date: Prep Date:

06/20/2012 1736 06/19/2012 1905 Units:

Units:

ug/L

Final Weight/Volume:

1.0 mL

Injection Volume:

2 uL

Leach Date:

N/A

0/	Dag
70	Mec.

		70 1100.					
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Benzo[a]anthracene	90	95	40 - 140	6	20		
Benzo[a]pyrene	87	91	40 - 140	5	20		
Benzo[b]fluoranthene	89	87	40 - 140	2	20		
Benzo[g,h,i]perylene	87	99	40 - 140	13	20		
Benzo[k]fluoranthene	99	106	40 - 140	7	20		
Benzoic acid	41	39	40 - 140	7	20	J	J *
Benzophenone	93	91	40 - 140	3	20		
Benzyl alcohol	66	69	40 - 140	4	20	J	J
Bis(2-chloroethoxy)methane	92	87	40 - 140	5	20		
Bis(2-chloroethyl)ether	76	78	40 - 140	3	20		
Bis(2-ethylhexyl) phthalate	90	92	40 - 140	2	20		
Butyl benzyl phthalate	83_	87	40 - 140	4	20		
Caprolactam	(33)	32	40 - 140	3	20	J *	J *
Carbazole	106	103	40 - 140	3	20		
Chrysene	85	84	40 - 140	1	20		
Dibenz(a,h)anthracene	88	98	40 - 140	11	20		
Dibenzofuran	90	90	40 - 140	0	20		
Diethyl phthalate	94	94	40 - 140	1	20		
Dimethyl phthalate	89	88	40 - 140	0	20		
Di-n-butyl phthalate	104	102	40 - 140	1	20		
Di-n-octyl phthalate	96	94	40 - 140	2	20		
Fluoranthene	99	99	40 - 140	0	20		
Fluorene	86	86	40 - 140	0	20		
Hexachlorobenzene	91	91	40 - 140	0	20		
Hexachlorocyclopentadiene	56	50	40 - 140	12	20	J	J
Hexachloroethane	72	74	40 - 140	4	20		
Indeno[1,2,3-cd]pyrene	87	99	40 - 140	13	20		
Isophorone	82	81	40 - 140	1	20		
N-Nitrosodi-n-propylamine	80	83	40 - 140	4	20		
N-Nitrosodiphenylamine	85	84	40 - 140	1	20		
Nitrobenzene	90	88	40 - 140	2	20		
Pentachlorophenol	80	76	30 - 130	5	20		
Phenanthrene	88	88	40 - 140	0	20		
Phenol	30	33	30 - 130	9	20	J	J

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40 - 140

40 - 140

6

84

89

79

89

20

20

Phenol Pyrene

Phenyl ether

Client: Olin Corporation

Job Number: 360-41200-1

Sdg Number: 360-41200-1

Method Blank - Batch: 360-92116

Method: 8270D Preparation: 3510C

Lab Sample ID:

MB 360-92116/1-A

Analysis Batch:

360-92162

Instrument ID:

Inst. B

Client Matrix: Dilution:

Water 1.0

Prep Batch:

360-92116

Lab File ID:

B17807.D

Analysis Date:

06/20/2012 1633

Leach Batch: N/A Initial Weight/Volume:

1000 mL

Prep Date:

06/19/2012 1905

Units:

ug/L

Final Weight/Volume:

1.0 mL

Leach Date:

N/A

	U
Injection	Volume:

2 uL

Analyte	Result	Qual	MDL	RL
1,1'-Biphenyl	ND		0.50	5.0
1,2,4,5-Tetrachlorobenzene	ND		0.50	5.0
1-Methylnaphthalene	ND		0.050	5.0
2,2'-oxybis[1-chloropropane]	ND		0.50	5.0
2,3,4,6-Tetrachlorophenol	ND		0.50	5.0
2,4,5-Trichlorophenol	ND		0.50	5.0
2,4,6-Trichlorophenol	ND		0.50	5.0
2,4-Dichlorophenol	ND		0.50	5.0
2,4-Dimethylphenol	ND		0.50	5.0
2,4-Dinitrophenol	ND		0.50	5.0
2.4-Dinitrotoluene	ND		0.50	5.0
2,6-Dinitrotoluene	ND		0.50	5.0
2-Chloronaphthalene	ND		0.50	5.0
2-Chlorophenol	ND		0.50	5.0
2-Methylnaphthalene	ND		0.050	1.0
2-Methylphenol	ND		0.50	5.0
2-Nitroaniline	ND		0.50	5.0
2-Nitrophenol	ND		0.50	5.0
3 & 4 Methylphenol	ND		0.50	5.0
3,3'-Dichlorobenzidine	ND		0.50	5.0
3-Nitroaniline	ND		0.50	5.0
4,6-Dinitro-2-methylphenol	ND		0.50	5.0
4-Bromophenyl phenyl ether	ND		0.50	5.0
4-Chloro-3-methylphenol	ND		0.50	5.0
4-Chloroaniline	ND		0.50	5.0
4-Chlorophenyl phenyl ether	ND		0.50	5.0
4-Nitroaniline	ND		0.50	5.0
4-Nitrophenol	ND		0.50	5.0
Acenaphthene	ND		0.050	1.0
Acenaphthylene	ND		0.050	0.30
Acetophenone	0.670	J	0.50	5.0
Aniline	ND		0.50	5.0
Anthracene	ND		0.070	1.0
Atrazine	ND		0.50	5.0
Azobenzene	ND		0.50	5.0
Benzaldehyde	ND		0.50	5.0
Benzo[a]anthracene	ND		0.17	0.30
Benzo[a]pyrene	ND		0.10	0.20
Benzo[b]fluoranthene	ND		0.15	0.30
Benzo[g,h,i]perylene	ND ND		0.094	0.50
Benzo[k]fluoranthene	ND ND		0.034	0.30
Benzoic acid	ND ND		0.50	5.0
	ND ND		0.50	5.0
Benzophenone Penzyl alcebel	ND ND		0.50	10
Benzyl alcohol			0.50	5.0
Bis(2-chloroethoxy)methane	ND		0.50	5.0

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Client: Olin Corporation

Job Number: 360-41200-1

Sdg Number: 360-41200-1

Method Blank - Batch: 360-92116

Method: 8270D Preparation: 3510C

Lab Sample ID:

MB 360-92116/1-A

Analysis Batch:

360-92162

Instrument ID:

Inst. B

Client Matrix: Dilution:

Water 1.0

Prep Batch:

360-92116

Lab File ID:

B17807.D

Analysis Date:

06/20/2012 1633

Leach Batch:

N/A

Initial Weight/Volume:

1000 mL

Prep Date:

06/19/2012 1905

Units:

ug/L

Final Weight/Volume:

1.0 mL

Leach Date:

Ν/Δ

Injection Volume:

2 uL

Leach Date: N/A				
Analyte	Result	Qual	MDL	RL
Bis(2-chloroethyl)ether	ND		0.50	5.0
Bis(2-ethylhexyl) phthalate	ND		0.50	2.0
Butyl benzyl phthalate	ND		0.50	5.0
Caprolactam	ND		0.50	5.0
Carbazole	ND		0.50	5.0
Chrysene	ND		0.17	1.0
Dibenz(a,h)anthracene	ND		0.064	0.50
Dibenzofuran	ND		0.50	5.0
Diethyl phthalate	ND		0.50	5.0
Dimethyl phthalate	ND		0.50	5.0
Di-n-butyl phthalate	1.16	J	0.60	5.0
Di-n-octyl phthalate	ND		0.73	5.0
Fluoranthene	ND		0.20	1.0
Fluorene	ND		0.080	1.0
Hexachlorobenzene	ND		0.50	1.0
Hexachlorocyclopentadiene	ND		0.50	5.0
Hexachloroethane	ND		0.50	3.0
Indeno[1,2,3-cd]pyrene	ND		0.079	0.50
Isophorone	ND		0.50	5.0
N-Nitrosodi-n-propylamine	ND		0.50	5.0
N-Nitrosodiphenylamine	ND		0.50	5.0
Nitrobenzene	ND		0.50	5.0
Pentachlorophenol	ND		0.50	1.0
Phenanthrene	ND		0.085	0.20
Phenol	ND		0.50	5.0
Pyrene	ND		0.19	5.0
Phenyl ether	ND		0.50	5.0
Surrogate	% Rec		Acceptance Limits	

Surrogate	% Rec	Acceptance Limits	***************************************
2-Fluorophenol	41	15 - 110	
Phenol-d5	24	15 - 110	
Nitrobenzene-d5	89	30 - 130	
2,4,6-Tribromophenol	94	15 - 110	
Terphenyl-d14	101	30 - 130	
2-Fluorobiphenyl	78	30 - 130	

Method Blank TICs- Batch: 360-92116

RT Qual Cas Number Analyte Est. Result Tentatively Identified Compound None

MJW a/5/12

Version 1.3, Oct 2011

OLIN-WILMINGTON LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625

Reviewer/Date MLR WASHING 9 4 11 Sr. Review/Date CM/5 K1 CMLL 10/3/11/2 Lab Report # 360-41203 Project # 6 102120018

Laboratory Deliverable Requirements				
atory Deliverable R		5		CONTRACTOR
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Laboratory	£			١
		22010101010	V 10 10 10 10 10 10 10 10 10 10 10 10 10	-

1.1 Laboratory Information : Was all of the Check items received.	n: Was all of the	following provided in the laboratory report?	ne laboratory report?	Yes [No	No [] N/A []	Comments:
☐ Name of Laboratory	☐ Address	Project ID	Phone #	Samp	le identifica	ion – Field aı	Sample identification – Field and Laboratory
Client Information:	回 Name	Address	ss	ntact (IDs must be	(IDs must be cross-referenced)	nced)
ACTION: If no, contact lab for submission of missing or illegible information.	ubmission of mi	ssing or illegible info	mation.				
1.2 Laboratory Report Certification Statement	ertification Sta	tement		Yes M	Yes M No!	N/A []	Comments:
 Does the laboratory report include a completed Analytical Report Certification in the required format?	a completed An	alytical Report Certific	ation in the required	format?]]	
ACTION: If no, contact lab for submission of missing certification or certification with correct format.	ımission of missi	ing certification or cert	ification with correct	format.			
1.3 Laboratory Case Narrative:	ırrative:			Yes [\(\frac{1}{2} \)	Yes [No [] N/A []	N/A [_]	Comments:
$oldsymbol{arGamma}$ Narrative serves as an exception report for the project and method QA/QC performance.	otion report for the	project and method QA	/QC performance.	☐ Narrativ	e includes	an explanatio	☐ Narrative includes an explanation of each discrepancy on the
					Certificatio	Certification Statement.	
ACTION: If no, contact lab for submission of missing or illegible information.	omission of missi	ng or illegible informa	ion.				
1.4 Chain of Custody (COC) copy present		of completed COC?		Yes [No	No [] N/A []	Comments:
Does the laboratory report include a copy of the completed Chain of Custody forms containing all samples in this SDG?	copy of the comp	leted Chain of Custody	forms containing all				

ACTION: If no, contact lab for submission of missing completed COC.

NOTE: Olin receives and maintains the original COC.

OLIN-WILMINGTON LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625

	es not apply).								☐ Dilution Factor ☐ Moisture or solids ☐ Reporting limits ☐ Date of preparation/extraction/digestion clean-up and analysis, where applicable its (soils must be reported in dry weight)
Comments:	ature requirement doe		Comments:			Comments:	Comments:	Comments:	☐% moisture or solids on/digestion clean-up and eweight)
N/A	ction, tempera		N/A			N/A	No [] N/A []	N/A	☐ Dilution Factor ☐ ─ ☐ ─ ─ ☐ Od ☐ ─ ☐ Date of preparation/extraction/dige: ☐ Units (soils must be reported in dry weight)
Yes \(\sum_\text{No} \sum_\text{N/A} \sum_\te	day as colle ferenced		Yes [No [N/A[No.	No [Y	No	n Factor preparation/e tt be reported
	on the same IDs cross re		Yes [Yes [Yes	Yes	☐ Dilution Factor☐ Date of preparate (soils must be repo
1.5 Sample Receipt Information (Cooler Receipt Form): Were each of the following tasks completed and recorded upon receipt of the sample(s) into the laboratory?	☑Sample temperature confirmed: must be 1° – 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply). ☐Container type noted ☐Condition observed ☐ pH verified (where applicable) ☐ Field and lab IDs cross referenced	ACTION: If no, contact lab for submission of missing or incomplete documentation.	1.5.1 Were the correct bottles and preservatives used?	Water - 1 Liter amber bottle/cool to 4°C Soil - 8 oz soil jar/cool to 4°C	ACTION: If no, inform senior chemist. Document justification for change in container/volume (if applicable), qualify positive and non-detect data (J) if cooler temperature exceeds 10°C. Rejection of data requires professional judgment.	1.5.2 Were all samples delivered to the laboratory without breakage?	1.5.3 Does the Cooler Receipt Form or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data?	1.6 Sample Results Section: Was the following information supplied in the laboratory Yes [] N/A [] report for each sample?	区 Field ID and Lab ID 区 Date and time collected では Analyst Initials

ACTION: If no, contact lab for submission of missing or incomplete information.

STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625 LEVEL I DATA QUALITY EVALUATION **OLIN-WILMINGTON**

	1.7 QA/QC Informati for each sample batch?	formation: Was the batch?	e following information p	1.7 QA/QC Information: Was the following information provided in the laboratory report Yes [No [] N/A [] for each sample batch?	Yes [No	N/N		Comments:
☐ Meth	☐ Method blank results		☐ LCS recoveries ☐ LMS/MSD recoveries and RPDs	veries and RPDs	ecoveries			
ACTIO	N: If no, contac	t lab for submission	ACTION: If no, contact lab for submission of missing or incomplete information.	e information.				
2.0	Holding Times	zel I			Yes No No NA	N		Comments:
	Have any techi	nical holding times,	Have any technical holding times, determined from date of	f collection to date of analysis, been exceeded?	en exceeded?			
NOTE: samplin	For water saing to extraction	mples, the holding and 40 days from e	NOTE: For water samples, the holding time is 7 days from sam sampling to extraction and 40 days from extraction to analysis.	pling to extraction and 40 days 1	from extraction	to analysis.	For soil	NOTE: For water samples, the holding time is 7 days from sampling to extraction and 40 days from extraction to analysis. For soil samples, the holding time is 14 days from sampling to extraction and 40 days from extraction to analysis.
ACTIO detect res	'N: If technical sults. For soil s	holding times are e: amples professional	xceeded, qualify all posit judgement will be used t	ACTION: If technical holding times are exceeded, qualify all positive results (J) and non-detects (UJ). detect results. For soil samples professional judgement will be used to determine if rejection is necessary.). For water san ry.	nples that ar	e grossly e	ACTION: If technical holding times are exceeded, qualify all positive results (J) and non-detects (UJ). For water samples that are grossly exceeded (>2X hold time) reject (R) all non-detect results. For soil samples professional judgement will be used to determine if rejection is necessary.
3.0 L	Laboratory Method	thod			Yes [No	No [] oN	N/A	Comments:
	3.1 Was	the correct laborat	Was the correct laboratory method used?					
	Wate Soil I Semi	Water Extraction Soil Extraction Semi-volatile Organics	3510C or 3520C 3540C or 3550B 8270C	3546 /				
ACTIO	N: If no, con	itact project mana	ACTION: If no, contact project manager to inform Client of	of change; request variance from	m Client; cont	act laborat	ory to pro	change; request variance from Client; contact laboratory to provide justification for method change

od change compared to the requested method. ACI

Comments: Yes [No [N/A[] Are the practical quantitation limits the same as those specified by the \square SOW \square QAPP \square Lah? NOTE: The QAPP and MADEP QA/QC Guidelines provides PQLs for semi-volatile organic compounds. Verify proper PQLs were used for each data set. 3.2

ACTION: If no, evaluate change with respect to sample matrix, preparation, dilution, moisture, etc. If sample PQL is indeterminate, contact lab for explanation.

OLIN-WILMINGTON

	LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625	VALUATIC RE AND C)N HECKLIST \$270C/625		
6	Are the appropriate parameter results present for each sample in the SDG?	Yes [No [N/A	Comments:
ACTION: If n	ACTION: If no, check Request for Analysis to verify if method was ordered and COC to verify that it was sent, and contact lab for resubmission of the missing data	: was sent, a	nd contact la	b for resubm	ission of the missing data
3.4	Were Tentatively Identified Compounds (TICs) reported?	Yes	No	N/A	Comments:
NOTE TICS are required guidance, i reported as based risk s	NOTE TICs are only required for samples with full MADEP target list. Determine if TICs are required. MADEP requires that all TICs be reported to the LCS. Per the MADEP guidance, TICs, which are identified as aliphatic hydrocarbons, do not have to be reported as TICs. However, these compounds must be evaluated as part of the health-based risk assessment approach (VPH/EPH).				
ACTION: Q	ACTION: Qualify reported TIC results as estimated and flag (NJ).		٠,		
3.5	If dilutions were required, were dilution factors reported?	Yes [No [N/A []	Comments:
ACTION: If n	ACTION: If no, contact the lab for submission.				
4.0 <u>Metb</u>	Method Blanks				
4.1	Is the Method Blank Summary present?	:	1		
ACTION:	ACTION: If no, call the laboratory for submission of missing data.	Yes	S S	N/A	Comments:
4.2	For the analysis of SVOCs, has a method blank been analyzed for each analysis batch of field samples of 20 or less?	Yes [Yes [\(\frac{1}{2} \text{ No } [\]	N/A[_]	Comments:
ACTION: justification.	If no, document discrepancy in case narrative and contact lab for n. Consult senior chemist for action needed.				

STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION OLIN-WILMINGTON

Yes [No [N/A [Comments: SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625 NOTE: MADEP allows common laboratory contaminants (such as phthalates) to be present at concentrations < 5x the PQL Is the method blank less than the PQL? 4.3

Do any method blanks have positive results for SVOC parameters? Qualify data Yes [No [] N/A [] Comments:

according to the following:

If the sample concentration is $< 10 \times \text{blank}$ value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

For the common contaminants (phthalates):

If the sample concentration is $> 10 \times \text{blank}$ value, no qualification is needed.

For other SVOC contaminants:

If the sample concentration is $< 5 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is $> 5 \times$ blank value, no qualification is needed.

10x = 165 Bis (2-ethylhexl) phthalate-16.5 DI-n-butil phymalate - 185

VAPPONS TICS

ACTION: For any blank with positive results, list all contaminants for each method blank, including the concentration detected and the flagging level (flagging level = 5x or 10x the blank value) and the associated samples and qualifiers.

Laboratory Control Standard

Comments: Was a laboratory control standard run with each analytical batch of 20 Yes [V] No[] N/A[] 5.1

Call laboratory for LCS form submittal. If data are not available, use professional judgment to determine the usability of sample results associated with that ACTION:

STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625 LEVEL I DATA QUALITY EVALUATION **OLIN-WILMINGTON**

	5.2 Is a LCS Summary Form present?	Yes [] No [] N/A [] Comments:	
	Is the recovery of any analyte outside of control limits?	N/A [1 Comments:	
			-n- buttl putholote
Is the recovery of any analyte outside of control limits? Yes Mol N/A Comments: Independent of the position of the positio		-141	1411154 521-22-42-157
wits? Yes [No [] N/A [] Comments: Z, 4, S-+\chicklereptue \(\chicklereptue \) \) itrophenol. The laboratory can line (\chicklereptue \(\chicklereptue \(\chicklereptue \(\chicklereptue \(\chicklereptue \) \) itrophenol. The laboratory can line (\chicklereptue \(\chicklereptue \) \) And the laboratory can line (\chicklereptue \(\chicklereptue \) \) And the laboratory can line (\chicklereptue \(\chicklereptue \) \) And the laboratory can line (\chicklereptue \(\chicklereptue \) \ \ \ \text{continuous can line (\chicklereptue \) \} And the laboratory can line (\chicklereptue \) \ \ \ \text{continuous can line (\chicklereptue \) \} And the laboratory can line (\chicklereptue \) \ \ \text{continuous can line (\chicklereptue \) \} And the laboratory can line (\chicklereptue \) \ \ \text{continuous can line (\chicklereptue \) \} And the laboratory can line (\chicklereptue \) \ \ \text{continuous can line (\chicklereptue \) \} And the laboratory can line (\chicklereptue \) \ \ \text{continuous can line (\chicklereptue \) \} And the laboratory can line (\chicklereptue \) \ \ \text{continuous can line (\chicklereptue \) \} And the laboratory can line (\chicklereptue \) \ \ \text{continuous can line (\chicklereptue \) \} And the laboratory can line (\chicklereptue \) \ \ \text{continuous can line (\chicklereptue \) \ \ \text{continuous can line (\chicklereptue \) \} And the laboratory can l	ACTION: If recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit but > 10%, qualify all positive and nodebut results within the batch as (D). If I CS recovery is 200%, qualify all positive and nodebut results within the batch as (D). If I CS recovery is 200%, qualify all positive and nodebut results are rejected (D).	v the lower limit but > 10%, qualify al	ll positive and no-

Yes [No [] N/A [] Comments: ACTION: If 80% of LCS recoveries are not within limits, use professional judgment Are 80% of LCS recoveries within laboratory control limits? and consult Senior Chemist. 5.4

Matrix Spikes 0.9

Matrix spikes may be collected at different frequencies based on monthly, quarterly, or task specific schedules. Confirm spike requirements for each set with the senior chemist.

OLIN-WILMINGTON LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625

6.1 were	6.1 Were project specified MS/MSDs collected? List project samples that were spiked.	Yes [Š	N/A	Yes No V N/A Comments:
ACTION: 1	ACTION: If no, contact senior chemist to see if any were specified.				
6.2	Is the MS/MSD recovery form present?	Yes	No	N/A [Yes No 1 N/A Comments:
ACTION:	ACTION: If no, contact lab for resubmission of missing data.]]		
6.3	Were matrix spikes analyzed at the required frequency of 1 per 20 $$ Yes $$ No $$ No $$ N/A $$ Comments: samples per matrix?	Yes	No	N/A [Comments:
ACTION:	ACTION: If any matrix spike data are missing, call lab for resubmission.				

LEVEL I DATA OHALITY EVALUATION **OLIN-WILMINGTON**

	Yes No N/A Comments:		
	N/A[_/]	
HECKLIST 8270C/625	No [)	
RE AND C	Yes [])	
STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625	ss outside of the QC limits?	Where: SSR = Spiked sample result	SR = Sample result
	Are any SVOC spike recoveries outside of the QC limits?	NOTE: $%R = (SSR-SR) \times 100\%$	SA
	6.4	NOTE	

NOTE: A full target, second source MS/MSD is required by MADEP.

SA = Spike added

NOTE: MADEP guidelines list MS/MSD recovery limits as 40-140 for base-neutral compounds and 30-130 for acid compounds.

NOTES: 1) If only one of the recoveries for an MS/MSD pair is outside of the control limits, no qualification is necessary. Use professional judgment for the MS/MSD flags.

2) If the MS/MSD was performed by the laboratory on a non-project sample, no

qualification is required.

ACTION: MS/MSD flags only apply to the sample spiked. If the recoveries of the MS and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit, qualify both positive results and nondetects (J). If LCS recovery is <10%, non-detect results are rejected (R).

OLIN-WILMINGTON LEVEL I DATA QUALITY EVALUATION

STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625	E AND CHECKLIS ETHOD 8270C/625	ı	
6.5 Are any RPDs for MS/MSD recoveries outside of the QC limits?	Yes No NA M	N/A [\inf	Comments:
NOTE: RPD = $S-D$ x 100% Where: S = MS sample result $(S+D)/2$ D = MSD sample result			
NOTE: MADEP guidelines list MS/MSD RPD limits for water as ≤ 20 and soils as ≤ 30 .			
NOTE: Laboratory control limits apply when spiked sample results fall within the normal calibration range. If dilutions are required due to high sample concentrations, the data are evaluated, but no flags are applied.			
ACTION: If the RPD exceeds the control limit, qualify positive results and non-detects (J).			
.0 Surrogate Recoveries			
Were one or more SVOC surrogate recoveries outside of laboratory limits for any sample or method blank? If yes, were samples re-analyzed?	Yes 📋 No 🗹	No [NA []	Comments:
NOTE: $\%R = QD \times 100\%$ Where: $S = MS$ sample result $D = MSD \text{ sample result}$			
NOTE: MADEP guidelines list surrogate limits for soils as 30-130% for all surrogates, and for water as 30-130% for base-neutrals and 15-110% for acid surrogates.			
NOTE: Qualify BNE results based upon BNE surrogates and AE results based upon AE surrogates.			
ACTION: If recoveries are >10%, but 2 or more from any one fraction (acid or baseneutral) fail to meet QC criteria: (1) For recoveries below the QC limit, qualify nondetects and positives (J), and (2) For recoveries above the QC limit, qualify only positives (J). If any surrogate recovery is <10% (unless the lab QC limits are below			

LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625 **OLIN-WILMINGTON**

10%, in which case, results are flagged as stated above), flag positives (J) and reject non-detects (R).				
8.0 Sampling Accuracy				
The majority of ground water samples are collected directly from a tap, process stream, or with dedicated tubing. Rinse blanks will not be collected.				
8.1 Were rinsate blanks collected? Prior to evaluating rinsate blanks, obtain a list of the associated samples from the project chemist.	Yes	No	No [\(\sqrt{N/A}\)[\)	Comments:
NOTE : MADEP does not specify the collection of rinsate blanks.				
8.2 Do any rinsate blanks have positive results?	Yes	No	No NA [Comments:
NOTE : For the common contaminants (phthalates), qualification is applied as indicated above using a 10x blank value in lieu of a 5x blank value.				
If the sample concentration is $< 5 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.				
If the sample concentration is $> 5 \times b$ lank value, no qualification is needed.				
9.0 Field Duplicates				
9.1 Were field duplicate samples collected? Obtain a list of the samples and their associated field duplicates.	Yes	No [V	No [L] N/A[_]	Comments:
9.2 Were field duplicates collected per the required frequency?	Yes []	No.	N/A[V	Comments:
☐ SOW ☐ QAPP ☐ MADEP Option 1(1 per 20) ☐ MADEP Option 3 (1 per 10)				
9.3 Was the RPD \leq 50% for soils or waters? Calculate the RPD for all results and	Yes [No	N/A[Comments:

OLIN-WILMINGTON LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST SEMI-VOLATILE ORGAINICS BY METHOD 8270C/625

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ACTION: RPD must be <50% for soil and water. Qualify data (J) for both sample results if the RPD exceeds 50%.

10.0 Application of Validation Qualifiers

Comments: Yes \[\sqrt{No} \] No \[\] N/A \[\] Was any of the data qualified?

If so, apply data qualifiers directly to the DQE copy of laboratory report and **flag pages** for entry in database.

REFERENCES

LAW, 1999, "Final Quality Assurance Project Plan, Olin Wilmington Property, 51 Eames Street, Wilmington, MA", LAW Engineering and Environmental Services, Kennesaw, GA 30144. August 1999.

STL-Westfield, 2002. "Olin - General Chemistry Control Limits (Soil & Water)," Severn Trent Laboratories, Inc., 53 Southampton Road, Westfield, MA, 01085.

U.S. Environmental Protection Agency (USEPA), 1996. "Region 1 EPA-NE Data Validation Guidelines For Evaluating Environmental Analyses"; Quality Assurance Unit Staff; Office of Environmental Measurement and Evaluation; December 1996 MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Compendium of Quality Control Requirements and Performance Standards for Selected Analytical Protocols," WSC-CAM #10-320, Final, Revision No. 1, 1 July 2010.

MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data in Support of Action Conducted Under the Massachusetts Contingency Plan (MCP)," WSC-CAM, Section VIIA, Final, Revision No. 1, 1

Client: Olin Corporation

Job Number: 360-41203-1

Sdg Number: 360-41203-1

Lab Control Sample/

Lab Control Sample Duplicate Recovery Report - Batch: 360-92527

Method: 8270D

Preparation: 3546

LCS Lab Sample ID:

LCS 360-92527/2-A

Analysis Batch:

360-92604 Instrument ID: Inst. B

Client Matrix:

Prep Batch:

Units:

360-92527 Lab File ID:

Dilution:

Solid 1.0

Leach Batch:

N/A

B18000.D

Analysis Date:

07/02/2012 2100

Initial Weight/Volume:

30.00 g 1.0 mL

Prep Date:

06/28/2012 1624

Final Weight/Volume: Injection Volume:

2 uL

Leach Date:

N/A

Analysis Batch:

360-92604

Instrument ID:

Inst. B

LCSD Lab Sample ID: LCSD 360-92527/3-A Client Matrix:

Solid

Prep Batch:

360-92527

Lab File ID:

B18001.D

Dilution: Analysis Date: 1.0

Leach Batch:

N/A

ug/Kg

Initial Weight/Volume: Final Weight/Volume:

30.00 g 1.0 mL

Prep Date:

07/02/2012 2133 06/28/2012 1624 Units:

LCS

ug/Kg

LCS Qual

Leach Date:

% Rec.	
--------	--

01	D
4/0	Rec

njection Volume:	2

RPD Limit

2 uL

N/A

70	•	100.
		100
		LUC

LCSD	Limit
98	40 - 140
89	40 - 140

njection	Volume:	

RPD

LCSD Qual

Amalista
Analyte
1,1'-Biphenyl
. 1,2,4,5-Tetrachlor
1,2,4-Trichlorober
1,2-Dichlorobenze
1,3-Dichlorobenze
1,4-Dichlorobenze
1-Methylnaphthale
N-Nitrosodimethyl
2,2'-oxybis[1-chlor
2,3,4,6-Tetrachlor
2,4,5-Trichlorophe
2,4,6-Trichlorophe
2,4-Dichloropheno
2,4-Dimethylphen
2,4-Dinitrophenol
2,4-Dinitrotoluene

2,3,4,6-Tetrachlorophenol
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,4-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
2-Chloronaphthalene
2-Chlorophenol
2-Methylnaphthalene
2-Methylphenol
2-Nitroaniline
2-Nitrophenol
3 & 4 Methylphenol
3,3'-Dichlorobenzidine
3-Nitroaniline
4,6-Dinitro-2-methylphenol
4-Bromophenyl phenyl ether
4-Chloro-3-methylphenol
4-Chloroaniline
4-Chlorophenyl phenyl ether
4-Nitroaniline
4-Nitrophenol
Acenaphthene

·					
1,1'-Biphenyl	111	98	40 - 140	12	20
1,2,4,5-Tetrachlorobenzene	98	89	40 - 140	10	30
1,2,4-Trichlorobenzene	88	77	40 - 140	13	30
1,2-Dichlorobenzene	95	85	40 - 140	11	30
1,3-Dichlorobenzene	91	80	40 - 140	13	30
1,4-Dichlorobenzene	93	82	40 - 140	12	30
1-Methylnaphthalene	95	85	40 - 140	11	30
N-Nitrosodimethylamine	85	78	40 - 140	8	30
2,2'-oxybis[1-chloropropane]	98	87	40 - 140	12	30
2,3,4,6-Tetrachlorophenol	139	119	40 - 140	15	30
2,4,5-Trichlorophenol	138	118	30 - 130	16	30
2,4,6-Trichlorophenol	141	124	30 - 130	12	30
2,4-Dichlorophenol	115	98	30 - 130	17	30
2,4-Dimethylphenol	118	101	30 - 130	16	30
2,4-Dinitrophenol	56	62	30 - 130	11	30
2,4-Dinitrotoluene	134	120	40 - 140	11	30
2,6-Dinitrotoluene	139	124	40 - 140	11	30
2-Chloronaphthalene	107	91	40 - 140	16	30
2-Chlorophenol	111	98	30 - 130	13	30
2-Methylnaphthalene	95	85	40 - 140	11	30
2-Methylphenol	111	98	30 - 130	12	30
2-Nitroaniline	135	115	40 - 140	16	30
2-Nitrophenol	105	94	30 - 130	11	30
3 & 4 Methylphenol	133	117	30 - 130	13	30
3,3'-Dichlorobenzidine	92	82	40 - 140	11	30
3-Nitroaniline	117	102	40 - 140	14	30
4,6-Dinitro-2-methylphenol	87	86	30 - 130	1	30
4-Bromophenyl phenyl ether	129	103	40 - 140	22	30
4-Chloro-3-methylphenol	119	107	30 - 130	10	30
4-Chloroaniline	67	60	40 - 140	11	30
4-Chlorophenyl phenyl ether	119	104	40 - 140	14	30
4-Nitroaniline	132	123	40 - 140	7	30
4-Nitrophenol	123	113	30 - 130	9	30
Acenaphthene	109	94	40 - 140	14	30

109

101

30

95

90

40 - 140

40 - 140

14

12

Acenaphthylene

Acetophenone

Client: Olin Corporation

Job Number: 360-41203-1

Sdg Number: 360-41203-1

Lab Control Sample/

Lab Control Sample Duplicate Recovery Report - Batch: 360-92527

Method: 8270D Preparation: 3546

LCS Lab Sample ID:

LCS 360-92527/2-A

Analysis Batch:

360-92604 Instrument ID: Inst. B

Client Matrix:

Solid

Prep Batch:

360-92527 Lab File ID: B18000.D

Dilution:

1.0

Leach Batch:

N/A Initial Weight/Volume: 30.00 g

Analysis Date: Prep Date:

07/02/2012 2100 06/28/2012 1624

Final Weight/Volume:

1.0 mL 2 uL

Leach Date:

N/A

Analysis Batch:

360-92604

Instrument ID:

LCSD Lab Sample ID: LCSD 360-92527/3-A Client Matrix:

Solid

Prep Batch:

360-92527

Lab File ID:

Injection Volume:

Inst. B B18001.D

Dilution:

Leach Batch:

N/A

ug/Kg

Initial Weight/Volume: Final Weight/Volume:

30.00 g 1.0 mL

Analysis Date: Prep Date:

07/02/2012 2133 06/28/2012 1624

Units:

Units:

ug/Kg

Injection Volume:

2 uL

Leach Date:

N/A

		<u>% Rec.</u>					
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Aniline	44	38	40 - 140	13	30	***************************************	*
Anthracene	121	105	40 - 140	14	30		
Atrazine	115	107	40 - 140	8	30		
Azobenzene	129	102	40 - 140	24	30		
Benzaldehyde	88	73	40 - 140	19	30		
Benzo[a]anthracene	142	131	40 - 140	8	30	*	
Benzo[a]pyrene	113	96_	40 - 140	16	30		
Benzo[b]fluoranthene	134	152	40 - 140	12	30		*
Benzo[g,h,i]perylene	116	99	40 - 140	16	30		
Benzo[k]fluoranthene	93	84	40 - 140	9	30		
Benzoic acid	62	58	30 - 130	6	30	J	J
Benzophenone	102	81	40 - 140	23	30		
Benzyl alcohol	116	106	30 - 130	10	30		
Bis(2-chloroethoxy)methane	108	91	40 - 140	18	30		
Bis(2-chloroethyl)ether	98	87	40 - 140	12	30		
Bis(2-ethylhexyl) phthalate	131	114	40 - 140	14	30		
Butyl benzyl phthalate	110	97	40 - 140	12	30		
Caprolactam	117	91	40 - 140	25	30		
Carbazole	152	130	40 - 140	16	30	*	
Chrysene	103	82	40 - 140	22	30		
Dibenz(a,h)anthracene	114	99	40 - 140	14	30		
Dibenzofuran	122	106	40 - 140	14	30		
Diethyl phthalate	125	108	40 - 140	14	30		
Dimethyl phthalate	119	104	40 - 140	14	30		
Di-n-butyl phthalate	(191)	159)	40 - 140	18	30	*	*
Di-n-octyl phthalate	115	126	40 - 140	9	30	8	
Eluoranthene	153	119	40 - 140	25	30	*	
Fluorene	111	100	40 - 140	11	30		
Hexachlorobenzene	139	113	40 - 140	20	30		
Hexachlorobutadiene	97	86	40 - 140	13	30		
Hexachlorocyclopentadiene	53	53	40 - 140	0	30		
Hexachloroethane	102	86	40 - 140	17	30		
Indeno[1,2,3-cd]pyrene	108	96	40 - 140	12	30		
Isophorone	90	76	40 - 140	16	30		
Naphthalene	89	78	40 - 140	12	30		
Nitrobenzene	105	91	40 - 140	14	30		

Client: Olin Corporation

Job Number: 360-41203-1

Sdg Number: 360-41203-1

Method Blank - Batch: 360-92527

Method: 8270D Preparation: 3546

Lab Sample ID:

MB 360-92527/1-A

Analysis Batch:

360-92604

Instrument ID:

Inst. B

Client Matrix: Dilution:

Solid 1.0

Prep Batch:

360-92527

Lab File ID:

B17999.D

Analysis Date:

07/02/2012 2028

Leach Batch:

N/A

Initial Weight/Volume: Final Weight/Volume:

30.00 g 1.0 mL

Prep Date:

06/28/2012 1624

Units:

ug/Kg

Injection Volume:

2 uL

Leach Date:

Analyte

N/A

Result	Qual	MDL	RL
ND		10	33
ND		15	170
ND		10	33

Benzo[k]fluoranthene	ND	enden (video (vi	10	33
Benzoic acid	ND		15	170
Benzophenone	ND		10	33
Benzyl alcohol	ND		28	67
Bis(2-chloroethoxy)methane	ND		10	33
Bis(2-chloroethyl)ether	ND		10	33
Bis(2-ethylhexyl) phthalate	16.5	J	10	67
Butyl benzyl phthalate	ND		10	33
Caprolactam	ND		10	33
Carbazole	ND		10	33
Chrysene	ND		10	33
Dibenz(a,h)anthracene	ND		10	33
Dibenzofuran	ND		10	33
Diethyl phthalate	ND		10	33
Dimethyl phthalate	ND		10	33
Di-n-butyl phthalate	185		29	67
Di-n-octyl phthalate	ND		17	33
Fluoranthene	ND		10	33
Fluorene	ND		10	33
Hexachlorobenzene	ND		10	33
Hexachlorobutadiene	ND		10	33
Hexachlorocyclopentadiene	ND		10	67
Hexachloroethane	ND		10	33
Indeno[1,2,3-cd]pyrene	ND		10	33
Isophorone	ND		10	33

isopilorone	ND	10	33
Naphthalene	ND	10	33
Nitrobenzene	ND	10	33
N-Nitrosodi-n-propylamine	ND	10	33
N-Nitrosodiphenylamine	ND	10	33
Pentachlorophenol	ND	10	33
Phenanthrene	ND	10	33
Phenol	ND	17	33
Diphenyl oxide	ND	10	33
Pyrene	ND	10	33
Diphenylamine	ND	10	33

Surrogate	% Rec	Acceptance Limits
2,4,6-Tribromophenol	92	30 - 130
2-Fluorobiphenyl	69	30 - 130
2-Fluorophenol	79	30 - 130
Nitrobenzene-d5	81	30 - 130
Phenol-d5	74	30 - 130
Terphenyl-d14	98	30 - 130

N-NITROSODI-N-PROPYLAMINE (NDPA) BY METHOD 521 STANDARD OPERATING PROCEDURE AND CHECKLIST N-NITROSODIMETHYLAMINE (NDMA) AND OLIN-WILMINGTON CHEMIST REVIEW

1/4/6	21/18	_	
NRN 1	101 10	1	1
WASHE	(4 card	41500	110021
Mike	(im)	19075	4019
Reviewer/Date	Sr. Review/Date	ab Report #	Project

|--|

laboratory report? Check items received.	items received.	i the following pro	wided in the res	Let Laboratory Information: was all of the following provided in the res of No N/A Comments: laboratory report? Check items received.
	☐ Address	Project ID	Phone #	Sample identification – Field and Laboratory
Client Information:	Name	\Box Address	Client Contact	(IDs must be cross-referenced)
☐ Data Package Narrative ☐ results and QC summaries	e 🔽 results and QC	Summaries	raw data	吐 chromatograms
ACTION: If no, contact lab for submission of missing or illegible information.	ubmission of missing	g or illegible informat	ion.	
1.1 Laboratory Case Narrative:				

Yes [\times \text{No} \]	N/A [_]	N/A [] Comments:
$ec{oldsymbol{arphi}}$ Narrative serves as an exception report for the project and method QA/QC performance.		
ACTION: If no, contact lab for submission of missing or illegible information.		

Chain of Custody (COC) copy present of completed COC? 1.2

Yes [No [NA [Comments:

Does the laboratory report include a copy of the completed Chain of Custody forms containing all samples in this SDG?

N-NITROSODI-N-PROPYLAMINE (NDPA) BY METHOD 521 STANDARD OPERATING PROCEDURE AND CHECKLIST **OLIN-WILMINGTON** CHEMIST REVIEW

ACTION: If no, contact lab for submission of missing completed COC.

1.3 Sample Receipt Information (Cooler Receipt Form): Were each of the following tasks completed and recorded upon receipt of the sample(s) into the laboratory?

Yes

Sample temperature confirmed: must be 1° – 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not	delivered on the same day as collection, temperature requirement does no
apply). Gontainer type noted Dondition observed Pfield and lab IDs cross referenced documentation.	ACTION: If no, contact lab for submission of missing or incomplete
1.3.1 Were the correct bottles and preservatives used?	Yes [No [] N/A [] Comments:
Water - 1 Liter amber bottle cool to 4°C. Sodium thiosulfate may be added if source is chlorinated.	
ACTION: If no, inform senior chemist. Document justification for change in container/volume (if applicable), qualify positive and non-detect data (J) if cooler temperature exceeds 10°C or use professional judgment for data rejection.	
1.3.2 Were all samples delivered to the laboratory without breakage?	$\mathbf{Yes} [$
1.3.3 Does the <i>Cooler Receipt Form</i> or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data?	Yes [] No [\sqrt{N} \] N/A [] Comments:
1.4 Sample Results Section: Was the following information supplied in the laboratory Yes [No [] N/A [] report for each sample?	Yes [No [] N/A [] Comments:

OLIN-WILMINGTON CHEMIST REVIEW STANDARD OPERATING PROCEDURE AND CHECKLIST N-NITROSODIMETHYLAMINE (NDMA) AND N-NITROSODI-N-PROPYLAMINE (NDPA) BY METHOD 521

T	Field ID and Lab ID	Date and time collected	ected	☐ Analyst Initials	☐ Dilution Factor	on Factor	☐ Reporting limits	
A	☐ Analysis method	□ Preparation method	Date of	□Date of preparation/extraction/ and analysis, □Matrix	nd analysis,	□ Matrix	☐ Farget analytes and concentrations	D Units
ACT	ION: If no, contact	ACTION: If no, contact lab for submission of missing or incomplete information.	ing or incon	nplete information.				
1.5	QA/QC Information	1.5 QA/QC Information: Was the following information provided in the laboratory	formation p	rovided in the laboratory				
N	☐ Method blank results ☐ LCS re	coveries	MS/MSD r	MS/MSD recoveries and RPDs	Yes No Internal Standard Recoveries	No [] ard Recoverio	Comments:	
ACT	ION: If no, contact	ACTION: If no, contact lab for submission of missing or incomplete information.	ing or incom	plete information.				
2.0	Holding Times				Yes	Yes No Ly N/A	Comments:	
	Have any technic	Have any technical holding times, determined from date	ed from dat	e of collection to date of analysis, been exceeded?	ınalysis, been	exceeded?		

ACTION: If technical holding times are exceeded, qualify all positive results (J) and non-detects (UJ). For water samples that are grossly exceeded (>2X hold time) reject (R) all non-detect results. For soil samples professional judgement will be used to determine if rejection is necessary.

NOTE: For water samples, the holding time is 7 days from sampling to extraction and 40 days from extraction to analysis.

N-NITROSODI-N-PROPYLAMINE (NDPA) BY METHOD 521 STANDARD OPERATING PROCEDURE AND CHECKLIST OLIN-WILMINGTON CHEMIST REVIEW

3.0	Labor	<u>Laboratory Method</u> Yes [\sqrt{No}
	3.1	Was the correct laboratory method used?
		Water Extraction 3510C or 3520C NDMA and NDPA 521 Mobifiep Sてい エチーSOP いるーMS-00 い
ACTI compa	ON: If red to th	ACTION: If no, contact project manager to inform Client of change; request variance from Client; contact laboratory to provide justification for method change compared to the requested method.
NON	3.2 E: The	3.2 Are the practical quantitation limits the same as those specified by the GAPP SOUTE: The project PQL is 2 ng/L for GW and 5 ng/L for SW.

Laboratory Method

3.0

STANDARD OPERATING PROCEDURE AND CHECKLIST N-NITROSODIMETHYLAMINE (NDMA) AND N-NITROSODI-N-PROPYLAMINE (NDPA) BY METHOD 521 **OLIN-WILMINGTON** CHEMIST REVIEW

3.3	Did the laboratory complete a mulit-point initial calibration with a NDMA-RPB ≤ 20 ? Is NDPA-RPB ≤ 30 ? Is the low point standard equal to the PQL?	Yes [\(\sum_{\text{No}} \) []	No		Comments:	
	*Multiple 4) $u_1 l_1 \lambda_2$ Has a second source standard been analyzed to verify initial calibration? Yes $[\ \ \ \]$ No $[\ \ \]$ Is the percent difference < 25?	Yes [No			
ь. 4.	Did the laboratory analyze a continuing calibration every 12 hours or every 20 samples? Was the NDMA recovery 80-120 percent (percent difference \leq 20)? Was the NDPA recovery 70 -130 percent (percent difference \leq 30)?	Yes [No []	No			
3.5	Is the RRT in the CCAL \pm 0.06 min from ICAL?	Yes [No [NA	No	N/A	Comments:	
ACTION:	ACTION: If no, contact the lab for submission.					
4.0 <u>Me</u>	Method Blanks					
4.1 ACTION:	4.1 Is the Method Blank Summary present? ACTION: If no, call the laboratory for submission of missing data.	Yes 🔀	No	Yes Moll N/A	Comments:	
4.2	For the analysis of NDMA, has a method blank been analyzed for each analysis batch of field samples of 20 or less?	Yes 🗾	No	Yes No NA	Comments:	
ACTION justificati	ACTION: If no, document discrepancy in case narrative and contact lab for justification. Consult senior chemist for action needed.					

OLIN-WILMINGTON CHEMIST REVIEW STANDARD OPERATING PROCEDURE

		N-NITROSODI-NETHYLAMINE (NDMA) AND N-NITROSODI-N-PROPYLAMINE (NDPA) BY METHOD 521	ND CHECK E (NDMA) PA) BY ME	AND THOD 52	_	
	4.3	Is the method blank less than the PQL?	Yes \[\int \text{No} \[\text{No} \[\text{NA} \[\text{L} \]	No	N/A[_]	Comments:
	4.4 D da	4.4 Do any method blanks have positive results for NDMA parameters? Qualify Yes [] No [M NA [] data according to the following:	Yes	No [Z	N/A [Comments:
	For N If the strange of the strange	For NDMA contaminants: If the sample concentration is $< 5 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.				
	If the	If the sample concentration is $> 5 \times \text{blank}$ value, no qualification is needed.				
0.	Labor	<u>Laboratory Control Sample</u>				
	5.1	Was a laboratory control sample extracted and run with each analytical batch of 20 samples or less?	Xes [] No []	No	N/A	Comments:
ACTI profes batch.	TION: fessional ch.	ACTION : Call laboratory for LCS form submittal. If data are not available, use professional judgment to determine the usability of sample results associated with that batch.				
	5.2	Is a LCS Summary Form present?	Yes [No [N/A[_]	Comments:
AC	TION:]	ACTION: If no, contact lab for resubmission of missing data.				

CHEMIST REVIEW STANDARD OPERATING PROCEDURE AND CHECKLIST N-NITROSODIMETHYLAMINE (NDMA) AND N-NITROSODI-N-PROPYLAMINE (NDPA) BY METHOD 521 **OLIN-WILMINGTON**

5.3 NOTE: Q ACTION: 1 positive and	5.3 Is the recovery of any analyte outside of control limits? NOTE: QAPP LCS recovery limits 60-140. ACTION: If recovery is above the upper limit, qualify all positive sample results within the batch as (J). If LCS recovery is <10%, non-detect results are rejected (R).	Yes [] No [VA [] Comments: batch as (J). If recovery is below the lower limit but > 1 sults are rejected (R).	10%, qualify all
6.0 <u>Mat</u>	Matrix Spikes		
Matrix spike task specific	Matrix spikes may be collected at different frequencies based on monthly, quarterly, or task specific schedules. Confirm spike requirements for each set with the senior chemist.		
6.1 were	6.1 Were project specified MS/MSDs analyzed? List project samples that were spiked.	Yes [] No [W/A [] Comments:	
ACTION	ACTION: If no, contact senior chemist to see if any were specified.		
6.2 ACTION:	6.2 Is the MS/MSD recovery form present? ACTION: If no, contact lab for resubmission of missing data.	Yes [] No [] N/A [by Comments:	
6.3	Were matrix spikes analyzed at the required frequency of 1 per 20^{-3} samples per matrix?	Yes No No NA Comments:	
ACTION:	ACTION: If any matrix spike data are missing, call lab for resubmission.		

521 STANDARD OPERATING PROCEDURE AND CHECKLIST OLIN-WILMINGTON CHEMIST REVIEW

N-NITROSODIMETHYLAMINE (NDMA) AND N-NITROSODI-N-PROPYLAMINE (NDPA) BY METHOD		
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Are any NDMA spike recoveries outside of the QC limits? 6.4

Yes \square No \square N/A \square Comments:

NOTE: $%R = (SSR-SR) \times 100\%$

Where: SSR = Spiked sample result

SR = Sample result

SA = Spike added

NOTE: *QAPP MS/MSD recovery limits are 60-140.*

NOTES: 1) Use professional judgment for the MS/MSD flags.

2) If the MS/MSD was performed by the laboratory on a non-project sample, no qualification is required.

ACTION: Professional judgment used to qualify associated samples. If the recoveries

of the MS and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit, qualify both positive results and non-detects (J).

Are any RPDs for MS/MSD recoveries outside of the QC limits? 6.5

Yes No No NA Comments:

x 100% S-D (S+D)/2 NOTE: RPD =_

Where: S = MS sample result

D = MSD sample result

NOTE: *QAPP MS/MSD RPD limits for water* \leq 20.

ACTION: If the RPD exceeds the control limit, qualify positive results and non-detects (J).

N-NITROSODI-N-PROPYLAMINE (NDPA) BY METHOD 521 STANDARD OPERATING PROCEDURE AND CHECKLIST N-NITROSODIMETHYLAMINE (NDMA) AND OLIN-WILMINGTON CHEMIST REVIEW

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Reco	
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7.0 I	

Were internal recoveries outside of laboratory limits for any sample or method Yes $[]$ No $[V]$ N/A $[]$ blank?	Yes	No Z	N/A []	Comments:
NOTE: Lab IS recovery limits 25 -150.				
ACTION: If recoveries are <10% and sample extracts were not diluted, reject non-				

detects and qualify positive detections as estimated (J). For recoveries outside the lab QC limit, qualify non-detects and positives (J).

Sampling Accuracy 8.0

If ground water samples are collected directly from a tap, process stream, or with dedicated tubing, rinse blanks will not be collected.

Yes No [V N/A Comments: 8.1 Were rinsate blanks collected? Prior to evaluating rinsate blanks, obtain a list of the associated samples.

8.2 Do any rinsate blanks have positive results?

Yes \square No \square N/A \square Comments:

NOTE:

If the sample concentration is $< 5 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is $> 5 \times$ blank value, no qualification is needed.

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OLIN-WILMINGTON CHEMIST REVIEW STANDARD OPERATING PROCEDURE AND CHECKLIST N-NITROSODIMETHYLAMINE (NDMA) AND N-NITROSODI-N-PROPYLAMINE (NDPA) BY METHOD 521

.0 Field Duplicates	sofe.	2000
	Junlie	and m
0.	FIPIN	TAIAT
0		

Yes [] No [\(\frac{\sqrt{N/A}}{\sqrt{N}} \] Comments:	Yes \square No \square NA \square Comments:	
	Yes [
9.1 Were field duplicate samples collected? Obtain a list of the samples and their associated field duplicates.	9.2 Was the RPD \leq 30% for waters? Calculate the RPD for all results and attach to this review.	

ACTION: RPD must be <30% for water. Qualify data (J) for both sample results if the RPD exceeds 30%.

10.0 Calculation and Transcription Checks

id NDPA Results	•	Recovery
☐ Sample NDMA ar		☐ Internal Standard
☐ Initial Calibration	☐ Continuing Calibration	☐ Method Blank Raw Data Reveiw

REFERENCES

MACTEC, 2009, "Project Operation Plan Volume III-B Quality Assurance Project Plan, Olin Wilmington Superfund Site, 51 Eames Street, Wilmington, MA", April 2009. U.S. Environmental Protection Agency (USEPA), 1996. "Region 1 EPA-NE Data Validation Guidelines For Evaluating Environmental Analyses"; Quality Assurance Unit Staff; Office of Environmental Measurement and Evaluation; December 1996.

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OLIN-WILMINGTON LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7 / 6020

Reviewer/Date My Le WASHEN	7	7
Sr. Review/Date Chas Promite 10	76	7
Lab Report # 360 - 41200		
Project # 26/40/2013		

1.0 <u>Laboratory Deliverable Requirements</u>

1.1 Laboratory Information: Was all of the following provided in the laboratory report? Yes [No [] N/A [] Check items received.	No [] N/A [] Comments:
☐ Name of Laboratory ☐ Address ☐ Project ID ☐ Phone # ☐ Samp Client Information: ☐ Name ☐ Address ☐ Client Contact	Sample identification – Field and Laboratory (IDs must be cross-referenced)
ACTION: If no, contact lab for submission of missing or illegible information.	
1.2 Laboratory Report Certification Statement	Yes \[\lambda \] No \[\] N/A \[\] Comments:
Does the laboratory report include a completed Analytical Report Certification in the required format?	
ACTION: If no, contact lab for submission of missing certification or certification with correct format.	
1.3 Laboratory Case Narrative:	Yes [] N/A [] Comments:
$ec{oldsymbol{ec{\mathcal{A}}}}$ Narrative serves as an exception report for the project and method QA/QC performance. on the	☑ Narrative includes an explanation of each discrepancy
	Certification Statement.
ACTION: If no, contact lab for submission of missing or illegible information.	
1.4 Chain of Custody (COC) copy present with all documentation completed	No [] N/A [] Comments:
NOTE: Olin receives and maintains the original COC.	
ACTION: If no, contact lab for submission of copy of completed COC.	

OLIN CORPORATION LEVEL I DATA QUALITY EVALUATION – OPTION 1 STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7

No [] N/A [] Comments:	Sample temperature confirmed: must be 1° – 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply). Gontainer type noted Esample condition observed PpH verified (where applicable) Drield and lab IDs cross referenced		No [] N/A [] Comments:	No [✓ N/A [] Comments:	No [] N/A [] Comments:	国 Dilution Factor Add % moisture or solids 日 Reporting limits of Date of preparation/extraction/digestion clean-up and analysis, where applicable 口nits (soils must be reported in dry weight)
Yes	ed on the s		Yes	is Yes []	e Yes [드 Dill E Dati Juits (soils
n present?): i upon receipt of the sample(s	ere sent by courier and delivere	e documentation.	without breakage?	rrative indicate other problems s, analytical problems or special ta?	g requirements supplied in th	☐ Avalyst Initials ☐ Preparation method
1.5 Sample Receipt Information (Cooler Receipt Form present?): Were each of the following tasks completed and recorded upon receipt of the sample(s) into the laboratory?	☐ Sample temperature confirmed: must be 1° − 10° C. (If samples were sent by courier and delivered on the same day as collecting temperature confirmed: must be 1° − 10° C. (If samples were sent by courier and delivered on the same day as collecting temperature.)	ACTION: If no, contact lab for submission of missing or incomplete documentation.	Were all samples delivered to the laboratory without breakage?	Does the Cooler Receipt Form or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data?	Sample Results Section: Was each of the following requirements supplied in the laboratory report for each sample?	Date and time collectedAnalysis methodTarget analytes and concentrations
1.5 Sample Receip Were each of the finto the laboratory?	Sample temperature cor	ACTION: If no, contact l:	1.5.1 W	1.5.2 D wi	1.6 Sample Res laboratory rel	Field ID and Lab ID Clean-up method Matrix

6010.doc

Comments:

N/A

No [

Yes []

1.7 QA/QC Information: Was each of the following information supplied in the laboratory report for each sample batch?

ACTION: If no, contact lab for submission of missing or incomplete information.

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LEVEL I DATA QUALITY EVALUATION – OPTION 1 STANDARD OPERATING PROCEDURE AND CHECKLIST **OLIN CORPORATION**

	ICP METALS BY METHOD 6010B/200.7	
☐ Method blank results	k results	
ACTION: If n	ACTION: If no, contact lab for submission of missing or incomplete information.	
2.0 Holdi	Holding Times	
Have any tech exceed	Have any technical holding times, determined from date of collection to date of analysis, been Yes [] No [N/A] Conexceeded? Holding time for metals is 180 days from sample collection to analysis for both water and soil.	Comments:
NOTE: List sa	NOTE: List samples that exceed hold time with # of days exceeded on checklist	
ACTION: If t (UJ).	ACTION: If technical holding times are exceeded, qualify all positive results (J) and non-detects (UJ). If grossly exceeded (2X holding time) reject (R) all non-detect results.	
3.0 <u>Labo</u>	<u>Laboratory Method</u>	
3.1	Was the correct laboratory method used?	Comments:
	Water Digestion 3005A or 3010A or 3020A Soil Digestion 3050B Metals 6010B or 200.7 most current matter?	
ACTION: If no, cor compared to the request and to request variance.	itact laboratory to provide justificated method. Contact senior chemist	
3.2	Are the practical quantitation limits the same as those specified by the $Yes[\]$ No $[\]$ N/A $[\]$ Co \Box SOW \Box QAPP \Box Lab \Box MADEP	Comments:
NOTE: Verif	NOTE: Verify that the reported metals match the target list specified on the COC.	

LEVEL I DATA QUALITY EVALUATION – OPTION 1 **OLIN CORPORATION**

ACTION: If no, check Request for Analysis to verify if method was ordered and COC to verify that it was sent, and contact lab for resubmission of the missing data Comments: Comments: Comments: Comments: Comments: Comments: Yes V No NA Frequency of Analysis: Was a method blank analyzed for each digestion Yes [J No [] N/A [] Yes [No [] N/A [] Yes [\(\sigma\) No [\) N/A[\) No[] N/A[] No[] N/A[] STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7 Yes [< Yes [< 4.4 Do any method blanks have positive results for metals? Qualify data according to ACTION: If no, contact laboratory for justification. Consult senior chemist for action NOTE: MADEP requires the method blank to be matrix matched and digested with the ACTION: If no, evaluate variation with respect to sample matrix, preparation, dilution, moisture, etc. If sample PQL is indeterminate, contact lab for explanation. Is the method blank less than the PQLs for all target elements? ACTION: If no, call the laboratory for submission of missing data. If dilutions were required, were dilution factors reported? Are results present for each sample in the SDG? Is the Method Blank Summary present? batch of < 20 field samples? ACTION: If no, contact the lab for submission. needed. Narrate non-compliance. Method Blanks the following: 43 3.4 4.1 4.2 3.3 samples

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STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION - OPTION 1 ICP METALS BY METHOD 6010B/200.7 **OLIN CORPORATION**

498 If the sample concentration is $< 5 \times$ blank value, flag sample result non-detect "U" at the If the sample concentration is $> 5 \times \text{blank}$ value, no qualification is needed. PQL or the concentration reported if greater than the PQL.

Sx: 2490 Sx- 108 SX: 6-55 ACTION: For any blank with positive results, list all contaminants for each method blank including the concentration detected and the flagging level (flagging level = 5x the blank value) and the associated samples and qualifiers.

Laboratory Control Standard 5.0

Comments: Was a laboratory control standard run with each analytical batch of 20 Yes of No No samples or less? 5.1

NOTE: A full target, second source LCS is required by MADEP.

ACTION: Call laboratory for LCS form submittal. If data are not available, use

professional judgement to evaluate data accuracy associated with that batch.

Is a LCS Summary Form present? 5.7

ACTION: If no, contact lab for resubmission of missing data.

Is the recovery of any analyte outside of MADEP control limits? MADEP

Comments: Yes [] No [\sqrt{N} \] N/A []

Comments:

Yes [\(\simeq \) No [] N/A[]

% Rec 80-120 Sample Type Water Soil

within Lab generated limits

ACTION: If recovery is above the upper limit, qualify all positive sample results If recovery is below the lower limit, qualify all positive and non-detects results within the batch as (J). If LCS recovery is <30%, positive and nondetect results are rejected (R). within the batch as (J).

Comments:

STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION – OPTION 1 ICP METALS BY METHOD 6010B/200.7 **OLIN CORPORATION**

Matrix Spikes 0.9

Matrix spikes may be collected at different frequencies based on monthly, quarterly, or task specific schedules. Confirm spike requirements for each set with the senior chemist.

Comments:
N/A[]
No Z
Yes
List project samples that were
c MS/MSDs collected?
Were project-specific spiked.
7

ACTION: If no, contact senior chemist to see if any were specified.

NOTE: A full target, second source MS/MSD is required by MADEP.

ACTION: If any matrix spike data are missing, call lab for resubmission.

ACTION: If any matrix spike data are missing, call lab for resubmission. If none, no qualification is needed. Narrate non-compliance.

Are any metal spike recoveries outside of the QC limits?

6.4

Comments:

NOTE:
 %R =
$$(SSR-SR)$$
 x 100%
 Where:
 SSR = Sample result

 NoTE:
 %R = $(SSR-SR)$ x 100%
 Where:
 SSR = Sample result

NOTE: If dilutions are required due to high sample concentrations (> 4X spike), the data are evaluated, but no flags are applied.

SA = Spike added

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OLIN CORPORATION LEVEL I DATA QUALITY EVALUATION – OPTION 1 STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7

rol	r the MS/MSD flags.
m MS/MSD pair is outside of the control	gment for the MS/MSD flags.
e of t	MS/M
outsid	$\overline{}$
air is	sent fc
(SD p	judgn
MS/N	is necessary. Use professional judgment for
r an	rofes
ss fo	Jse p
overie	ry. U
e rec	scessary
of th	is ne
one	ation
If only one of the recoveries for an MS/MSD	imits, no qualification i
Ä	, 110
VOT	imits, no q

and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit, qualify positive ACTION: MS/MSD flags only apply to the sample spiked. If the recoveries of the MS results and non-detects (J).

6.5 Are any RPDs for MS/MSD recoveries outside of the QC limits?

Yes \square No \square NA \square

Comments:

NOTE: RPD = S-D x 100% (S+D)/2

Where: S = MS sample result D = MSD sample result

NOTE: If dilutions are required due to high sample concentrations, the data are evaluated, but no flags are applied.

ACTION: If the RPD exceeds the control limit, qualify positive results and non-detects

7.0 Laboratory Duplicate

Comments: If so, is the Laboratory Yes No [NA [7.1 Was a laboratory duplicate sample analyzed? Duplicate Sample Form present?

NOTE: MADEP refers to this sample as a "matrix duplicate".

ACTION: If not analyzed, qualification is not needed. If data is missing, contact laboratory for resubmission of report. Narrate non-compliance.

7.2 Is the RPD between the result for the laboratory duplicate sample and the result for the parent sample outside of the QA/QC limits?

Yes No NA Comments:

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STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION - OPTION 1 ICP METALS BY METHOD 6010B/200.7 **OLIN CORPORATION**

QAPP RPD	20	20	20	20
MADEP Laboratory Duplicate Sample RPD Criteria:	For aqueous results > $5x$ RL, RPD must be $\pm 20\%$	For aqueous results $< 5 \times RL$, RPD must be $\leq RL$	For soil/sediment results > $5 \times$ RL, RPD must be $\pm 35\%$	For soil/sediment results < $5 \times$ RL, RPD must be $\leq 2 \times$ RL

ACTION: If the RPD exceeds the limits, qualify both positive results and non-detects as estimated and flag them J. Narrate non-compliance

Sampling Accuracy 8.0

The majority of ground water samples are collected directly from a tap, process stream, or with dedicated tubing. Rinse blanks will not be collected.

Yes No [NA NA Were rinsate blanks collected? Prior to evaluating rinsate blanks, obtain a list of the associated samples from the senior chemist. 8.1

Comments:

Do any rinsate blanks have positive results? 8.2 NOTE: MADEP does not require the collection of rinsate blanks.

Yes No No Comments:

ACTION: Evaluate rinsate results against blank results to determine if contaminant may be laboratory-derived. If results are not lab-related, qualify according to below.

If the sample concentration is $< 5 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL

If the sample concentration is $> 5 \times$ blank value, no qualification is needed.

Field Duplicates 9.0

9.1 Were field duplicate samples collected? Obtain a list of samples and their associated Yes [] No [] N/ATT field duplicates.

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OLIN CORPORATION

	LEVEL I DATA QUALITY EVALUATION – OPTION 1 STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7	
	9.2 Were field duplicates collected per the required frequency? \mathbf{Xes} \mathbf{I} No \mathbf{I} No \mathbf{I} Comments:	
SC	SOW 🛚 QAPP (1 per 10) 🗎 MADEP Option 1 (1 per 20) 🖾 MADEP Option 3 (1 per 10) 🗇	
	9.3 Was the RPD \leq 50% for soils or waters? Calculate the RPD for all results and Yes [] No [] N/A [\checkmark Comments: attach to this review.	
ACTI	ACTION : RPD must be ≤50% for soil and water. Qualify data (J) for both sample results if the RPD exceeds 50%.	
10.0	Special OA/OC	
	10.1 Were both total and dissolved metals analysis performed? If so, the Yes [] No [] N/A [] Comments: dissolved metal concentration should not exceed that of the total metal.	

10.0

concentration is 10% higher than the total, flag both results as estimated (J). If total and dissolved concentrations are less than 5x the PQL and the difference exceeds 2x the **ACTION:** If results for both total and dissolved are $\geq 5x$ the PQL and the dissolved PQL, flag both results as estimated (J)

OLIN CORPORATION LEVEL I DATA QUALITY EVALUATION – OPTION 1 STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7

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Comments:
N/A
No
Yes
~;
Was any of the data qualified?
Was any of the da
Was aı

If so, apply data qualifiers directly to the DQE copy of laboratory report and flag pages for entry in database.

REFERENCES

- LAW, 1999, "Final Quality Assurance Project Plan, Olin Wilmington Property, 51 Eames Street, Wilmington, MA", LAW Engineering and Environmental Services, Kennesaw, GA 30144. August 1999
- U.S. Environmental Protection Agency (USEPA), 1989. "Region 1 Laboratory Data Validation Functional Guidelines For Evaluating Inorganic Analyses"; Hazardous Site Evaluation Division; February 1989.
- MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Compendium of Quality Control Requirements and Performance Standards for Selected Analytical Protocols," WSC-CAM #10-320, Final, Revision No. 1, 1 July 2010.
- MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data in Support of Action Conducted Under the Massachusetts Contingency Plan (MCP)," WSC-CAM, Section VIIA, Final, Revision No. 1, 1 July 2010.
- Spectrometry (ICP-AES) in Support of Response Actions under the Massachusetts Contingency Plan (MCP)" WSC-CAM, Final, Revision No. 1, 5 July MADEP, 2010. "Quality Control Requirements and Performance Standards for the Analysis of Trace Metals by Inductively Coupled Plasma-Atomic Emission

Quality Control Results

Client: Olin Corporation

Job Number: 360-41200-1

Sdg Number: 360-41200-1

Method Blank - Batch: 360-92236

Method: 6010C Preparation: 3010A

Lab Sample ID:

MB 360-92236/1-A

Analysis Batch:

360-92308

Instrument ID:

Varian ICP

Client Matrix:

Water

Prep Batch:

360-92236

Lab File ID:

N/A

Dilution:

1.0

Leach Batch:

N/A

Initial Weight/Volume:

50 mL

Analysis Date: Prep Date:

06/22/2012 1648 06/22/2012 0945 Units:

ug/L

Final Weight/Volume:

50 mL

Leach Date:

N/A

Analyte	Result	Qual	MDL	RL	
Aluminum	ND		13	100	000000000000000000000000000000000000000
Arsenic	ND		3.3	10	
Barium	ND		2.5	10	
Beryllium	ND		0.079	1.0	
Calcium	ND		54	400	
Cadmium	ND		0.24	1.0	
Cobalt	ND		1.2	10	
Chromium	ND		0.53	5.0	
fron	21.6	J	12	100	
Potassium	498	J	360	4000	
Magnesium	ND		40	400	
Manganese	1.31	J	0.81	10	
Sodium	ND		700	2000	
Nickel	ND		1.5	10	
Antimony	ND		3.8	6.0	
Selenium	ND		3.8	10	
Tin	ND		4.1	50	
Thallium	ND		2.4	10	
Vanadium	ND		1.3	10	
Zinc	ND		7.2	50	

Version 1.3, Oct 2011

OLIN-WILMINGTON LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7

CK CK

Date Mike WASMANDUN 9/5/12	"Date (In G. Com 1) 3/17	ort # 360-41203	Dion City in
Reviewer/Date M	Sr. Review/Date (Lab Report # 30	Droiect #

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1.1 Laboratory information: was all of the following provided in the laboratory report? Yes No NA Comments: Check items received.	Project ID ID Phone # ID Sample identification – Field and Laboratory ID Address ID Client Contact (IDs must be cross-referenced)	illegible information.	Yes [] No [] N/A [] Comments:	Does the laboratory report include a completed Analytical Report Certification in the required format?	ACTION: If no, contact lab for submission of missing certification or certification with correct format.	Yes [No [] N/A [] Comments:	Narrative serves as an exception report for the project and method QA/QC performance.	Certification Statement.	eaible information.
as all of the following provided	Address 🖪 Project ID Name	ission of missing or illegible	ication Statement	mpleted Analytical Report Co	sion of missing certification or	ve:	seption report for the project		ion of missing or illegible info
Check items received.	☐ Name of Laboratory ☐ Client Information: ☐	ACTION: If no, contact lab for submission of missing or illegible information.	1.2 Laboratory Report Certification Statement	loes the laboratory report include a col	ICTION: If no, contact lab for submiss	1.3 Laboratory Case Narrative:	回 Narrative serves as an exconthe		ACTION: If no, contact lab for submission of missing or illegible information.

ACTION: If no, contact lab for submission of copy of completed COC.

NOTE: Olin receives and maintains the original COC.

1.4 Chain of Custody (COC) copy present with all documentation completed

Comments:

OLIN CORPORATION LEVEL I DATA QUALITY EVALUATION – OPTION 1 STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7

1.5 Sample Recei Were each of the	1.5 Sample Receipt Information (Cooler Receipt Form present?): Yes [Were each of the following tasks completed and recorded upon receipt of the sample(s)	[No [] N/A [] Comments:
into the laboratory?	into the laboratory? Sample temperature confirmed: must be $1^{\circ} - 10^{\circ}$ C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply).	same day as collection, temperature requirement does not apply).
☐ Container type noted ☐	☐ Container type noted ☐ sample condition observed ☐ pH verified (where applicable) ☐ Field and lab IDs cross referenced	Ds cross referenced
ACTION: If no, contact lal	ACTION: If no, contact lab for submission of missing or incomplete documentation.	
1.5.1 We	Were all samples delivered to the laboratory without breakage? $ ightarrow m Yes$ [$ ightharpoonup$	No [] N/A [] Comments:
1.5.2 Do with circ	Does the Cooler Receipt Form or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special Yes circumstances affecting the quality of the data?	Yes [] No [] N/A [] Comments:
1.6 Sample Resulaboratory rep	Sample Results Section: Was each of the following requirements supplied in the $ m Yes$ Laboratory report for each sample?	No [] N/A [] Comments:
Field ID and Lab ID Clean-up method Matrix	☐ Date and time collected ☐ Analyst Initials ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	ロ Dilution Factor
ACTION: If no, contact la	ACTION: If no, contact lab for submission of missing or incomplete information.	
1.7 QA/QC Info laboratory report for	1.7 QA/QC Information: Was each of the following information supplied in the Yes	[No [] N/A [] Comments:

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OLIN CORPORATION LEVEL I DATA QUALITY EVALUATION – OPTION 1 STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7

ì						
Ž	Method blank results		☐ LCS recoveries / KMS/MSD recoveries and RPDs / KD Laboratory duplicate results (where applicable)	results (where	applicable)	
ACTI	ON: If m	o, contact lab for submission	ACTION: If no, contact lab for submission of missing or incomplete information.			
2.0	Holdi	Holding Times				
Have	any techr exceed water a	 technical holding times, determinexceeded? Holding time for metals water and soil. 	Have any technical holding times, determined from date of collection to date of analysis, been Yes [] exceeded? Holding time for metals is 180 days from sample collection to analysis for both water and soil.	No [N/A	Comments:
NOTI	E: List sar	aples that exceed hold time w	NOTE: List samples that exceed hold time with # of days exceeded on checklist			
ACTI	ON: If t	echnical holding times are ex f grossly exceeded (2X holdi	ACTION: If technical holding times are exceeded, qualify all positive results (J) and non-detects (UJ). If grossly exceeded (2X holding time) reject (R) all non-detect results.			
3.0	Labo	Laboratory Method				
	3.1	Was the correct laboratory method used?	tory method used?] No[]	N/A	Comments:
		Water Digestion Soil Digestion Metals	3005A or 3010A or 3020A 3050B 6010B or 200.7			
AC con and	TION: pared to to reque	ACTION: If no, contact laborator compared to the requested method. C and to request variance.	ACTION: If no, contact laboratory to provide justification for method change compared to the requested method. Contact senior chemist to inform Client of change and to request variance.			
	3.2	Are the practical guant □SOW = QAP	Are the practical quantitation limits the same as those specified by the \overline{Nes} \square SOW \square QAPP \square Lab \square MADEP	Yes [No [NA []	N/A	Comments:
NO	TE: Verif	that the reported metals ma	NOTE: Verify that the reported metals match the target list specified on the COC.			

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OLIN CORPORATION LEVEL I DATA QUALITY EVALUATION – OPTION 1

	STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7	JRE AND 6010B/20	CHECKL 0.7	IST	
ACTION:	ACTION: If no, evaluate variation with respect to sample matrix, preparation, dilution, moisture, etc. If sample PQL is indeterminate, contact lab for explanation.				
3.3	Are results present for each sample in the SDG?	Yes [No	N/A []	Comments:
ACTION: If1	ACTION: If no, check Request for Analysis to verify if method was ordered and COC to verify that it was sent, and contact lab for resubmission of the missing data	was sent, ar	ıd contact la	b for resubm	ssion of the missing data
3.4	If dilutions were required, were dilution factors reported?	Yes [No [N/A	Comments:
ACTION: If1	ACTION: If no, contact the lab for submission.				
4.0 <u>Met</u>	Method Blanks				
4.1	Is the Method Blank Summary present?	Yes [No	N/A []	Comments:
ACTION:	ACTION: If no, call the laboratory for submission of missing data.				
4.2	Frequency of Analysis: Was a method blank analyzed for each digestion batch of < 20 field samples?	Yes 🗹	No	N/A[_]	Comments:
ACTION: needed. Na	ACTION : If no, contact laboratory for justification. Consult senior chemist for action needed. Narrate non-compliance.				
43	Is the method blank less than the PQLs for all target elements?	Voc I: A		L 7 4/7	Commonto.
NOTE: M. samples	NOTE: MADEP requires the method blank to be matrix matched and digested with the samples			TANK TANK	Comments.
4.4 the fc	4.4 Do any method blanks have positive results for metals? Qualify data according to the following:	Yes	No [N/A	Comments:

OLIN CORPORATION LEVEL I DATA QUALITY EVALUATION – OPTION 1 STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7

28.3 50001 If the sample concentration is $< 5 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL. If the sample concentration is $> 5 \times \text{blank}$ value, no qualification is needed.

ACTION: For any blank with positive results, list all contaminants for each method blank including the concentration detected and the flagging level (flagging level = 5x the blank value) and the associated samples and qualifiers.

5.0 Laboratory Control Standard

Comments:	
N/A	
No	
Yes [
Was a laboratory control standard run with each analytical batch of 20 samples or less?	
5.1	

NOTE: A full target, second source LCS is required by MADEP.

ACTION: Call laboratory for LCS form submittal. If data are not available, use professional judgement to evaluate data accuracy associated with that batch.

Comments: Yes [No [] N/A[] Is a LCS Summary Form present? 5.7

ACTION: If no, contact lab for resubmission of missing data.

Cab ran LCS against certified reference Comments: Yes No No Is the recovery of any analyte outside of MADEP control limits? within Lab generated limits MADEP % Rec 80-120 Sample Type Water Soil

ACTION: If recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit, qualify all positive and non-detects results within the batch as (J). If LCS recovery is <30%, positive and nondetect results are rejected (R). Comments:

STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION - OPTION 1 ICP METALS BY METHOD 6010B/200.7 **OLIN CORPORATION**

Matrix Spikes 0.9

Matrix spikes may be collected at different frequencies based on monthly, quarterly, or task specific schedules. Confirm spike requirements for each set with the senior chemist.

Comments:
N/A
No [
Xes [
were
that
samples
roject
List pr
i C
collected
S/MSDs
MS/]
Were project-specific spiked.
Were spiked.
Τ,

ACTION: If no, contact senior chemist to see if any were specified.

ACTION: If any matrix spike data are missing, call lab for resubmission. If none, no qualification is needed. Narrate non-compliance.

Are any metal spike recoveries outside of the QC limits?

6.4

NOTE: If dilutions are required due to high sample concentrations (> 4X spike), the data are evaluated, but no flags are applied.

OLIN CORPORATION LEVEL I DATA QUALITY EVALUATION – OPTION 1 STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7

and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit, qualify positive ACTION: MS/MSD flags only apply to the sample spiked. If the recoveries of the MS results and non-detects (J).

6.5 Are any RPDs for MS/MSD recoveries outside of the QC limits?

Yes [] No [] N/A [

Comments:

NOTE: RPD = S-D x 100% (S+D)/2

Where: S = MS sample result D = MSD sample result

NOTE: If dilutions are required due to high sample concentrations, the data are evaluated, but no flags are applied.

ACTION: If the RPD exceeds the control limit, qualify positive results and non-detects

7.0 Laboratory Duplicate

Comments: If so, is the Laboratory Yes [] No [Y N/A [] 7.1 Was a laboratory duplicate sample analyzed? Duplicate Sample Form present?

NOTE: MADEP refers to this sample as a "matrix duplicate".

ACTION: If not analyzed, qualification is not needed. If data is missing, contact laboratory for resubmission of report. Narrate non-compliance.

7.2 Is the RPD between the result for the laboratory duplicate sample and the result for the parent sample outside of the QA/QC limits?

Yes [] No [] N/A [Comments:

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STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION - OPTION 1 ICP METALS BY METHOD 6010B/200.7 **OLIN CORPORATION**

OAPP RPD	20	20	20	20
MADEP Laboratory Duplicate Sample RPD Criteria:	For aqueous results > $5x$ RL, RPD must be $\pm 20\%$	For aqueous results < $5x$ RL, RPD must be \leq RL	For soil/sediment results > $5x$ RL, RPD must be $\pm 35\%$	For soil/sediment results < $5x$ RL, RPD must be $\leq 2x$ RL

ACTION: If the RPD exceeds the limits, qualify both positive results and non-detects as estimated and flag them J. Narrate non-compliance

Sampling Accuracy 8.0

The majority of ground water samples are collected directly from a tap, process stream, or with dedicated tubing. Rinse blanks will not be collected.

Yes \square No \square N/A \square Comments: Comments: No [V] N/A[] Were rinsate blanks collected? Prior to evaluating rinsate blanks, obtain a list of Yes Do any rinsate blanks have positive results? the associated samples from the senior chemist. 8.2 8.1

NOTE: MADEP does not require the collection of rinsate blanks.

ACTION: Evaluate rinsate results against blank results to determine if contaminant may be laboratory-derived. If results are not lab-related, qualify according to below.

If the sample concentration is $< 5 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is $> 5 \times \text{blank}$ value, no qualification is needed.

Field Duplicates 9.0

Comments: 9.1 Were field duplicate samples collected? Obtain a list of samples and their associated $_{
m Yes}$ $_{
m I}$ $_{
m No}$ $_{
m I}$ $_{
m I}$ $_{
m I}$ field duplicates.

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OLIN CORPORATION

LEVEL I DATA QUAI STANDARD OPERATIN ICP METALS	LEVEL I DATA QUALITY EVALUATION – OPTION I STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7
9.2 Were field duplicates collected per the required frequency?	Yes No N/A G
SOW 🛚 QAPP (1 per 10) 🖾 MADEP Option 1 (1 per 20) 🖾 MADEP Option 3 (1 per 10) 🗁	ption 3 (1 per 10) 🗇
9.3 Was the RPD \leq 50% for soils or waters? Calculate the RPD for all results and Yes [] attach to this review.	for all results and Yes [] No [] N/A [\checkmark Comments:
ACTION: RPD must be ≤50% for soil and water. Qualify data (J) for both sample results if the RPD exceeds 50%.	oth sample results if the RPD exceeds 50%.
10.0 Special OA/OC	
10.1 Were both total and dissolved metals analysis performed? If so, the Yes [] dissolved metal concentration should not exceed that of the total metal.	med? If so, the Yes [] No [] N/A [] Comments: I metal.

ACTION: If results for both total and dissolved are $\geq 5x$ the PQL and the dissolved concentration is 10% higher than the total, flag both results as estimated (J). If total and dissolved concentrations are less than 5x the PQL and the difference exceeds 2x the PQL, flag both results as estimated (J)

OLIN CORPORATION LEVEL I DATA QUALITY EVALUATION – OPTION 1 STANDARD OPERATING PROCEDURE AND CHECKLIST ICP METALS BY METHOD 6010B/200.7

5.1.5	
A	
A 11: 0 4	
	2

Comments:
N/A[]
No[]
Yes
17
data qualifiec
/as any of the data qu

If so, apply data qualifiers directly to the DQE copy of laboratory report and flag pages for entry in database.

REFERENCES

- LAW, 1999, "Final Quality Assurance Project Plan, Olin Wilmington Property, 51 Eames Street, Wilmington, MA", LAW Engineering and Environmental Services, Kennesaw, GA 30144. August 1999
- U.S. Environmental Protection Agency (USEPA), 1989. "Region 1 Laboratory Data Validation Functional Guidelines For Evaluating Inorganic Analyses"; Hazardous Site Evaluation Division; February 1989.
- MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Compendium of Quality Control Requirements and Performance Standards for Selected Analytical Protocols," WSC-CAM #10-320, Final, Revision No. 1, 1 July 2010.
- MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data in Support of Action Conducted Under the Massachusetts Contingency Plan (MCP)," WSC-CAM, Section VIIA, Final, Revision No. 1, 1 July 2010.
- Spectrometry (ICP-AES) in Support of Response Actions under the Massachusetts Contingency Plan (MCP)" WSC-CAM, Final, Revision No. 1, 5 July MADEP, 2010. "Quality Control Requirements and Performance Standards for the Analysis of Trace Metals by Inductively Coupled Plasma-Atomic Emission

Quality Control Results

Client: Olin Corporation

Job Number: 360-41203-1

Sdg Number: 360-41203-1

Method Blank - Batch: 360-92320

Method: 6010C Preparation: 3050B

Lab Sample ID: Client Matrix: MB 360-92320/1-A

INIB 300-9

Solid

Dilution: Analysis Date: Prep Date:

1.0

06/26/2012 1401 06/25/2012 1221

Leach Date:

N/A

Analysis Batch:

Prep Batch: Leach Batch:

Units:

360-92426 360-92320

N/A mg/Kg Instrument ID:

Lab File ID:

Initial Weight/Volume:

N/A

Final Weight/Volume:

2.0 g 100 mL

Varian ICP

Analyte	Result	Qual	MDL	RL	
Aluminum	ND		0.34	2.5	000000000000000000000000000000000000000
Silver	ND		0.026	0.50	
Arsenic	ND		0.11	1.0	
Barium	ND		0.12	0.50	
Beryllium	ND		0.0019	0.20	
Calcium	7.66	J	3.2	10	
Cadmium	ND		0.0066	0.20	
Cobalt	ND		0.047	0.50	
Chromium	ND		0.12	0.50	
Copper	ND		0.14	1.0	
Iron	2.60	J	1.8	5.0	
Potassium	ND		5.2	200	
Magnesium	2.01	J	0.83	10	
Manganese	ND		0.051	1.0	
Sodium	ND		37	100	
Nickel	ND		0.072	1.0	
Lead	ND		0.049	0.50	
Antimony	ND		0.20	0.50	
Selenium	ND		0.24	0.50	
Tin	1.29	J	0.42	5.0	
Thallium	ND		0.15	1.0	
Vanadium	ND		0.038	0.50	
Zinc	ND		0.21	2.5	

M)W

Version 1, Oct 2011

LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST MERCURY BY METHOD 7470A / 7471A / EPA 245.1 **OLIN-WILMINGTON**

Reviewer/Date/MIXE WASHBURY, 9/5/12	Sr. Review/Date CM Least 10/31/17	Report # 360-41200 0 /	ect # 6104120018
Reviewe	Sr. Review	Lab Report	Project #

ties."

	Note: The following analyses will be evaluated according to the "MADEP QA/QC Guidelines for Sampling, Data Evaluation and Reporting Activities. " MADEP, however, may not always list QA/QC criteria for every chemical analysis. Where not defined by MADEP, criteria will default to values stipulated in the QAPP*. Where the QAPP does not define criteria, QA/QC requirements will default to limits employed by the laboratory.
1.0	<u>Laboratory Deliverable Requirements</u>
	1.1 Laboratory Information: Was all of the following provided in the laboratory report? Yes [No [] N/A [] Comments: Check items received.
	E Name ○ Address □ Address □ Address □ Phone # □ Client Information: (IDs must be cross-referenced)
AC	ACTION: If no, contact lab for submission of missing or illegible information.
	1.2 Laboratory Report Certification Statement Yes [No [] N/A [] Comments:
Doe	Does the laboratory report include a completed Analytical Report Certification in the required format?
ACT	ACTION: If no, contact lab for submission of missing certification or certification with correct format.
	1.3 Laboratory Case Narrative: Are both of the following statements true?
	Marrative serves as an exception report for the project and method QA/QC performance.
	Certification Statement.
ACT	ACTION: If no, contact lab for submission of missing or illegible information.

NOTE: Olin receives and maintains the original COC.

1.4 Chain of Custody (COC) copy present with all documentation completed

Yes [No [N/A [Comments:

ACTION: If no, contact lab for submission of missing original COC.

LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST MERCURY BY METHOD 7470A / 7471A / EPA 245.1 **OLIN-WILMINGTON**

Were each of the following $\mathbf{Yes} \ \ \ \ \ \ \ \ \ \ \ \ \ $	☑ Sample temperature confirmed: must be 1° − 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply). ☐ Container type noted ☐ Custody seals checked ☐ Condition observed ☐ pH verified (where applicable) ☐ Field and lab IDs cross referenced	ttion.	Yes \wideharder{\summa} No [] N/A []] Comments:	n for change in ata (J) if cooler nent	akage? $\mathbf{Yes} [] $	problems or special Yes [] No [] N/A [] Comments:	ints supplied in the \mathbf{Yes} $\mathbf{Comments}$:	首 Analyst Initials
1.5 Sample Receipt Information (Cooler Receipt Form): Were each of the tasks completed and recorded upon receipt of the sample(s) into the laboratory?	nperature confirmed: must be $1^{\circ} - 10^{\circ}$ C. (If samples were setype noted \Box Custody seals checked \Box Condition observed	ACTION: If no, contact lab for submission of missing or incomplete documentation.	 1.5.1 Were the correct bottles and preservatives used? Water - 1 Liter polyethylene/HNO₃ to pH<2, cool to 4°C Soil - 8 oz soil jar/cool to 4°C 	ACTION: If no, inform senior chemist. Document justification for change in container/volume (if applicable), qualify positive and non-detect data (J) if cooler emperature exceeds 10°C. Rejection of data requires professional judgment	1.5.2 Were all samples delivered to the laboratory without breakage?	1.5.3 Does the Cooler Receipt Form or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data?	1.6 Sample Results Section: Was each of the following requirements supplied in the laboratory report for each sample?	 ID E Date and time collected ID Analysis method ID Target analytes and concentrations
1.5 task	Sample ter	ACTION: Is		ACTION: container/vc			1.6	Field ID and Lab Clean-up method Matrix

Page 2 of 10

1.7 QA/QC Information: Was each of the following information supplied in the Yes \swarrow No \bigcirc N/A \bigcirc laboratory report for each sample batch?

ACTION: If no, contact lab for submission of missing or incomplete information.

Comments:

TLCS recoveries NAKMSD recoveries and RPDs Attaboratory duplicate results (where applicable) ☐ Method blank results

ACTION: If no, contact lab for submission of missing or incomplete information.

2.0 Holding Times

Comments: Have any technical holding times, determined from date of collection to date of analysis, been Yes [] No [J N/A] exceeded? Holding time for mercury is 28 days from sample collection to analysis for both water and soil.

NOTE: List samples that exceed hold time with # of days exceeded on checklist

ACTION: If technical holding times are exceeded, qualify all positive results (J) and reject (R) all non-detect results.

3.0 Laboratory Method

3.1	Was the correct laboratory method used?	Yes 🗹	No [] N/A [
Merc	$\operatorname{cury}\left(\operatorname{extracts},\operatorname{aqueous}\right)$ wastes, $\operatorname{surface}$ & ground waters)	7470A	
Merc	cury (soil, sediments, bottom deposits, sludges)	7471A	
Merc	cury (drinking, surface, saline waters; wastes)	245.1	

Comments:

ACTION: If no, contact laboratory to provide justification for method change compared to the requested method. Contact senior chemist to inform Client of change and to request variance.

7 µg/L 0.2 µg/L	Yes [No [] N/A [] Comments:	Method 245.1 7470A	the same as those I MADEP? QAPP POL 0.2 μg/L 0.2 μg/L	QAPP □ Lab MADEP PQL 1 µg/L	Sample Type Water (GW-3)
		7471 A	() ()4 mg/Kg	20 ma/Ka	(1-M1) & (-2)
		245.1	0.2 µg/L	' ,	Walci
ت القرار 2.0 = التراقط التراقط التراقط التراقط التراقط التراط التراقط التراقط التراقط التراقط التراقط التراقط ا		315 1	7/2		17040
- 0.2 µg/L		Method	PQL	PQL	ample Type
PQL PQL - 0.2 μgL			QAPP	MADEP	
ΜΑΒΕΡ QΑΡΡ ΡQL PQL - 0.2 μg/L			☐ MADEP?	QAPP 🗆 Lab	MOS□
GOAPP \Box Lab \Box MADEP? Yes \Box MADEP QAPP \Box PQL \Box Method \Box		specified by the	the same as those	/quantitation limits	.2 Are the practica

ACTION: If no, evaluate variation with respect to sample matrix, preparation, dilution, moisture, etc. If sample PQL is indeterminate, contact lab for explanation.

Yes 🗹 No 🗌 N/A 📋 3.3 Are the appropriate results present for each sample in the SDG?

Comments:

ACTION: If no, check Request for Analysis to verify if method was ordered and COC to verify that it was sent, and contact lab for resubmission of the missing data

 $3.4~\mathrm{H}$ dilutions were required, were dilution factors reported?

Yes \[\sum_\ No \[\] N/A \[\]

Comments:

ACTION: If no, contact the lab for submission.

4.0 Method Blanks

4.1 Is the Method Blank Summary present?

Comments:

Yes [\sqrt{\sqrt{No}}] N/A[]

ACTION: If no, contact the laboratory for submission of missing data.

Frequency of Analysis: Was a method blank analyzed for each digestion Yes [No [] N/A [] Comments: batch of < 20 field samples? 4.2

ACTION: If no, contact laboratory for justification. Consult senior chemist for action needed. Narrate non-compliance.

4.4 Do any 1 mercury? Qual	Do any method/instrument/reagent blanks have positive results for Ye mercury? Qualify data according to the following:		No [Yes No I NA	Comments:
If the sample conce at the PQL	If the sample concentration is < 5 x blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.				
ACTION: If yes, contact samples unless all detected contaminants for each met flagging levels (flagging levelth with positive results. List all	ACTION : If yes, contact laboratory to redigest and reanalyze all associated samples unless all detected results are $> 5 \times$ method blank level. Otherwise, list contaminants for each method blank including the concentration detected and flagging levels (flagging level $= 5 \times$ blank value) on the checklist for any blank with positive results. List all affected samples and their qualifiers.				
Laboratory Control Standard	ol Standard				
5.1 Is an LCS	Is an LCS Summary Form present?	es [No	Yes [\(\int \) No \(\] N/A \(\]	Comments:
ACTION: Hno, o	ACTION: If no, contact lab for resubmission of missing data.				
5.2 Was a laboratory cc < 20 field samples?	entrol standard (LCS) run with each digestion batch of	se S	Yes [\(\sqrt{No} \)	N/A []	Comments:
ACTION: If no, creanalyze all assocassociated with that	ACTION: If no, contact laboratory for LCS form submittal. If none, redigest/reanalyze all associated samples. If the data is not available, reject (R) data associated with that batch. Narrate non-compliance.				
5.3 Is the reco	Is the recovery of mercury outside of control limits?	Yes	No [V	No [\sqrt{N/A} []	Comments:

5.0

Note: MADEP QA/QC lists the recommended LCS recovery limits.

MADEP QAPP	% Rec % Rec Method	N/A 80-120 245.1	80-120 80-120 7470A	Lab limits 80-120 7471A
	Sample Type	Water	Water	Soil

> 50%, qualify all positive results and non-detects within the batch as (J). If the LCS recovery is < 50%, both positive and non-detect results are unusable (R). Narrate AQUEOUS ACTION: If yes, and recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit but non-compliance.

SOLID ACTION: If yes, and recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit, qualify all positive results and non-detects within the batch as (J). Unusable (R) qualification of solid positive and non-detect results due to LCS failures is not required. Narrate non-compliance.

6.0 Matrix Spikes

- Comments: Yes No No NA Were project-specific MS/MSDs analyzed? List project samples that were spiked. ACTION: If no, contact senior chemist to see if any were specified.
- Yes \[\] No \[\] N/A \[\superight \] Comments: Is the Matrix Spike/Matrix Spike Duplicate Recovery Form present?

ACTION: If no, contact lab for resubmission of missing data.

6.2

Were matrix spikes analyzed at the required frequency of 1 per digestion Yes [] No [] N/A $[\checkmark]$ Comments: batch of < 20 field samples? 6.3

ACTION: If any matrix spike data are missing, call lab for resubmission. If none, no qualification is needed. Narrate non-compliance.

6.4 Were any mercury spike recoveries outside of the recovery limits?	pike recoveries	outside of the	e recovery limits?	Yes \square No \square N/A \square Comments:	Comments:
	MADEP	QAPP			
Sample Type	% Rec	% Rec	Method		
Water	N/A	75-125	245.1		
Water	75-125	75-125	7470A		
Soil	75-125	50-150	7471A		
NOTE: % Recovery = (spiked sample result - sample result) × 100% (spike amount added)	(spiked samp) (spike amo	sed sample result – (spike amount added)	sample result) × 100°	%	

ACTION: Laboratory control limits apply when spiked sample results fall within the normal calibration range. If dilutions are required due to high sample concentrations, the data are evaluated, but no flags are applied.

NOTES: 1) If only one of the recoveries for an MS/MSD pair is outside of the control limits, no qualification is necessary. Use professional judgment for the MS/MSD flags. 2) If the MS/MSD was performed by the laboratory on a non-project sample, no qualification is required.

ACTION: MS/MSD flags only apply to the sample spiked. If the recoveries of the MS and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit but > 30%, qualify both positive results and non-detects (J). If the MS/MSD recovery is < 30% and the sample is

non-detect, the results are considered unusable and flagged (R).

ACTION: Laboratory control limits apply when spiked sample results fall within the normal calibration range. If dilutions are required due to high sample concentrations, the data is evaluated, but no flags are applied.

STANDARD OPERATING PROCEDURE AND CHECKLIST MERCURY BY METHOD 7470A / 7471A / EPA 245.1 LEVEL I DATA QUALITY EVALUATION **OLIN-WILMINGTON**

limits? Yes \square No \square N/A \square Comments:					
le of the QC		Method	245.1	7470A	7471A
veries outsic	QAPP	RPD	20	20	20
Are any RPDs for MS/MSD recoveries outside of the QC limits?	MADEP	RPD	N/A	20	35
PDs					

ACTION: If the RPD exceeds the control limit, qualify both positive results and Where: S = MS sample result D = MSD sample result S-D x 100% (S+D)/2

NOTE: RPD=

the normal calibration range. If dilutions are required due to high sample ACTION: Laboratory control limits apply when spiked sample results fall within concentrations, the data are evaluated, but no flags are applied. non-detects (J). Narrate non-compliance.

Laboratory Duplicate Sample 7.0

7.1 Was a laboratory duplicate sample analyzed? If so, is the Laboratory Yes [] No [] N/A [] Duplicate Sample Form present?

Comments:

NOTE: MADEP refers to this sample as a "matrix duplicate".

ACTION: If not analyzed, qualification is not needed. If data is missing, contact laboratory for resubmission of report. Narrate non-compliance.

	7.2 Is the RPD between the mercury result for the laboratory duplicate sample and the result for the parent sample outside of the QA/QC limits?	Yes	No [] N/A [N/A [Comments:	
	MADEP Laboratory Duplicate Sample RPD Criteria:					
	For aqueous results > $5x$ RL, RPD must be $\pm 20\%$ 20 For aqueous results < $5x$ RL, RPD must be \le RL 20 For soil/sediment results > $5x$ RL, RPD must be $\pm 35\%$ 20 For soil/sediment results < $5x$ RL, RPD must be $\le 2x$ RL 20					
	ACTION: If the RPD exceeds the limits, qualify both positive results and nondetects as estimated and flag them J. Narrate non-compliance					
8.0	Sampling Accuracy					
	8.1 Were rinsate blanks collected? Prior to evaluating rinsate blanks, obtain a list of the associated samples from the senior chemist.	Yes [No.	N/A	Comments:	
	8.2 Do any rinseate blanks have positive results?	Ves	No I JAN	N/A [Comments.	
	ACTION: Evaluate rinseate results against blank results to determine if contaminant may be laboratory-derived. If results are not lab-related, qualify according to the table below.				Comments.	
	Sample conc. $< 5x$ blank value: Sample conc. $> 5x$ blank value: Flag sample result "U" No qualification is needed				·	
,	NOTE: MADEP does not require the collection of rinseate blanks.					
9.0	Field Duplicates					
	9.1 Were field duplicate samples collected? Obtain a list of samples and their associated field duplicates.	Yes	No	N/A [Comments:	
	9.2 Were field duplicates collected per the required frequency?	Yes [No	N/A [Comments:	
SC	SOW ☐ QAPP ☐ MADEP Option 1 (1 per 20) ☐ MADEP Option 3 (1 per 10) ☐					

STANDARD OPERATING PROCEDURE AND CHECKLIST MERCURY BY METHOD 7470A / 7471A / EPA 245.1 LEVEL I DATA QUALITY EVALUATION OLIN-WILMINGTON

□ N/A [Comments:	eds 50%.		Yes No No NA Comments:
9.3 Was the RPD \leq 50% for soils or waters? Calculate the RPD for all results and Yes [] N/A [\leq Comments: attach to this review.	ACTION: RPD must be ≤50% for soil and water. Qualify data (J) for both sample results if the RPD exceeds 50%.	Application of Validation Qualifiers	If data tables have not been produced, apply data qualifiers directly to DQE Yes [No scopy of laboratory report and flag pages for entry in database
	ACT	10.0	

10.0

no data validation actions

REFERENCES

LAW, 1999, "Final Quality Assurance Project Plan, Olin Wilmington Property, 51 Eames Street, Wilmington, MA", LAW Engineering and Environmental Services, Kennesaw, GA 30144. August 1999 USEPA, 1988. "Laboratory Data Validation Functional Guidelines for Evaluating Organic and Inorganic Analysis," EPA/540/R-94-012 and EPA/540-R-94-013, July 1988.

MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Quality Control Requirements and Performance Standards for the Analysis of Mercury by Cold Vapor Atomic Absorption (CVAA) Spectrometry in Support of Response Actions under the Massachusetts Contingency Plan (MCP)" WSC-CAM, Section IIIB, Final, Revision No. 1, 1 July 2010.

Version 1, Oct 2011

STANDARD OPERATING PROCEDURE AND CHECKLIST MERCURY BY METHOD 7470A / 7471A / EPA 245.1 LEVEL I DATA QUALITY EVALUATION **OLIN-WILMINGTON**

Lab Report # 310 - 4120 Project # 6107120018 Reviewer/Date Mike Sr. Review/Date Chas

ies."

	Note: The following analyses will be evaluated according to the "MADEP QA/QC Guidelines for Sampling, Data Evaluation and Reporting Activities. " MADEP, however, may not always list QA/QC criteria for every chemical analysis. Where not defined by MADEP, criteria will default to values stipulated in the QAPP*. Where the QAPP does not define criteria, QA/QC requirements will default to limits employed by the laboratory.
1.0	<u>Laboratory Deliverable Requirements</u>
	1.1 Laboratory Information: Was all of the following provided in the laboratory report? Yes $[$
	□ Name of Laboratory □ Address □ Project ID □ Sample identification – Field and Laboratory Client Information: □ Name □ Address □ Phone # □ Client Contact (IDs must be cross-referenced)
ACT	ACTION: If no, contact lab for submission of missing or illegible information.
	1.2 Laboratory Report Certification Statement Yes [\int NO [] N/A [] Comments:
Does	Does the laboratory report include a completed Analytical Report Certification in the required format?
ACTI	ACTION: If no, contact lab for submission of missing certification or certification with correct format.
	1.3 Laboratory Case Narrative: Are both of the following statements true? Yes [No [] N/A [] Comments:
4	Marrative serves as an exception report for the project and method QA/QC performance. DA/QC performance. Certification Statement.
ACTI	ACTION: If no, contact lab for submission of missing or illegible information.
	1.4 Chain of Custody (COC) copy present with all documentation completed Yes [No [] N/A [] Comments:

NOTE: Olin receives and maintains the original COC.

ACTION: If no, contact lab for submission of missing original COC.

1.5 Sample Receipt Information (Cooler Receipt Form): Were each of the following Yes $\[\]$ No $\[\]$ N/A $\[\]$ Comments:	Zample temperature confirmed: must be 1° − 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply). Container type noted ∑Custody seals checked ∑Condition observed ∑pH verified (where applicable) ∑Field and lab IDs cross referenced	ACTION: If no, contact lab for submission of missing or incomplete documentation.	Were the correct bottles and preservatives used?	ACTION: If no, inform senior chemist. Document justification for change in container/volume (if applicable), qualify positive and non-detect data (J) if cooler temperature exceeds 10°C. Rejection of data requires professional judgment	Were all samples delivered to the laboratory without breakage? Yes Molin N/A Dolon Comments:	Does the Cooler Receipt Form or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special Yes [] No [] N/A [] Comments: circumstances affecting the quality of the data?	1.6 Sample Results Section: Was each of the following requirements supplied in the $Xes[\]$ No $[\]$ N/A $[\]$ Comments: laboratory report for each sample?	ab ID III Date and time collected III Analyst Initials III Dilution Factor III Was moisture or solids III Reporting limits IIII IIII IIII IIIIIIIIIIIIIIIIIIIII
1.5 Sample Receipt Infortasks completed and reco	Sample temperature confirmed: Container type noted	TION: If no, contact lab for su	1.5.1 Were the Water - 1 Liter Soil - 8 oz soi	CTION: If no, inform antainer/volume (if applical operature exceeds 10°C. Re	1.5.2 Were all s	1.5.3 Does the with samp circumstan	1.6 Sample Results Se laboratory report for	E Field ID and Lab ID E ID

ACTION: If no, contact lab for submission of missing or incomplete information.

Comments: 1.7 QA/QC Information: Was each of the following information supplied in the Yes $\[\]$ No $\[\]$ N/A $\[\]$ laboratory report for each sample batch?

STANDARD OPERATING PROCEDURE AND CHECKLIST MERCURY BY METHOD 7470A / 7471A / EPA 245.1 LEVEL I DATA QUALITY EVALUATION OLIN-WILMINGTON

ĭ □	☐ Method blank results ☐ LCS recoveries ☐ MS/MSD recoveries and RPDs ☐ Laboratory duplic	☐ Laboratory duplicate results (where applicable)	
ACT	ACTION: If no, contact lab for submission of missing or incomplete information.		
2.0	Holding Times		
Have	Have any technical holding times, determined from date of collection to date of analysis, been Yes Exceeded? Holding time for mercury is 28 days from sample collection to analysis for both water and soil.	No [N/A] Comments:	
NOT	NOTE: List samples that exceed hold time with # of days exceeded on checklist		
ACT	ACTION: If technical holding times are exceeded, qualify all positive results (J) and reject (R) all non-detect results.		
3.0	Laboratory Method		
	3.1 Was the correct laboratory method used?	Yes [v] No [] N/A [] Comments:	
	Mercury (extracts, aqueous wastes, surface & ground waters) 7470A Mercury (soil, sediments, bottom deposits, sludges) 7471A Mercury (drinking, surface, saline waters; wastes) 245.1		
	ACTION: If no, contact laboratory to provide justification for method change compared to the requested method. Contact senior chemist to inform Client of change and to request variance.		

	Yes [No [N/A [Comments:					
specified by the			Method	245.1	7470A	7471A
the same as those	□ MADEP?	QAPP	POL	$0.2~\mu g/L$	$0.2 \mu g/L$	0.04 mg/Kg
quantitation limits	APP Lab	MADEP	PQL		1 µg/L	20 mg/Kg
3.2 Are the practical	□ SOW ☐QAPP □ Lab □ MADEP?		Sample Type	Water	Water (GW-3)	Soil (S-1 & GW-1)

ACTION: If no, evaluate variation with respect to sample matrix, preparation, dilution, moisture, etc. If sample PQL is indeterminate, contact lab for explanation.

Yes [No [] N/A [] 3.3 Are the appropriate results present for each sample in the SDG?

ACTION: If no, check Request for Analysis to verify if method was ordered and COC to verify that it was sent, and contact lab for resubmission of the missing data

 $\operatorname{Yes}[\mathcal{Y}] = \operatorname{No}[]$ 3.4 If dilutions were required, were dilution factors reported?

Comments:

ACTION: If no, contact the lab for submission.

4.0 Method Blanks

4.1

Comments: Yes [No [] N/A [] Is the Method Blank Summary present?

ACTION: If no, contact the laboratory for submission of missing data.

Comments: Frequency of Analysis: Was a method blank analyzed for each digestion Yes [\(\subseteq \) No [] N/A [] batch of < 20 field samples? 4.2

ACTION: If no, contact laboratory for justification. Consult senior chemist for action needed. Narrate non-compliance.

4.4 Do any method/instrument/reagent blanks have positive results for Yes [] No [] NA [] mercury? Qualify data according to the following:	Yes [] No [] NA [] Comments:
If the sample concentration is < 5 x blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.	
ACTION : If yes, contact laboratory to redigest and reanalyze all associated samples unless all detected results are $> 5 \times$ method blank level. Otherwise, list contaminants for each method blank including the concentration detected and flagging levels (flagging level = $5 \times$ blank value) on the checklist for any blank with positive results. List all affected samples and their qualifiers.	
Laboratory Control Standard	
5.1 Is an LCS Summary Form present?	Yes $[\checkmark]$ No $[\]$ N/A $[\]$ Comments:
ACTION: If no, contact lab for resubmission of missing data.	
Was a laboratory control standard (LCS) run with each digestion batch of $\mathbf{Yes} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	Yes \[\sqrt{No} \[\] N/A \[\] Comments:
ACTION: If no, contact laboratory for LCS form submittal. If none, redigest/reanalyze all associated samples. If the data is not available, reject (R) data associated with that batch. Narrate non-compliance.	
5.3 Is the recovery of mercury outside of control limits?	Yes $[]$ No $[\mathcal{M}]$ N/A $[]$ Comments:
Note: MADEP QA/QC lists the recommended LCS recovery limits.	

5.0

MADEP QAPP	% Rec % Rec Method	<i>N/A</i> 80-120 245.1	80-120 80-120 7470A	Lab limits 80-120 7471A
	Sample Type	Water	Water	Soil

AQUEOUS ACTION: If yes, and recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit but > 50%, qualify all positive results and non-detects within the batch as (J). If the LCS recovery is < 50%, both positive and non-detect results are unusable (R). Narrate non-compliance.

SOLID ACTION: If yes, and recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit, qualify all positive results and non-detects within the batch as (J). Unusable (R) qualification of solid positive and non-detect results due to LCS failures is not required. Narrate non-compliance.

6.0 Matrix Spikes

- Yes No No NA Comments: Were project-specific MS/MSDs analyzed? List project samples that were spiked. ACTION: If no, contact senior chemist to see if any were specified.
- Yes No NA Comments: Is the Matrix Spike/Matrix Spike Duplicate Recovery Form present?

ACTION: If no, contact lab for resubmission of missing data.

6.2

Comments: Were matrix spikes analyzed at the required frequency of 1 per digestion Yes [] No [] N/A [] batch of < 20 field samples? 6.3

ACTION: If any matrix spike data are missing, call lab for resubmission. If none, no qualification is needed. Narrate non-compliance.

Were any mercury spike recoveries outside of the recovery limits?	spike recoveries	s outside of th	e recovery limits?	Yes \square No \square N/A \square Comments:	₹	Comments:
	MADEP	QAPP				
Sample Type	% Rec	% Rec	Method			
	N/A	75-125	245.1			
	75-125	75-125	7470A			
	75-125	50-150	7471A			
Recovery =	(spiked samp (spike am	ked sample result – (spike amount added)	NOTE: % Recovery = (spiked sample result – sample result) × 100% (spike amount added)	%		

ACTION: Laboratory control limits apply when spiked sample results fall within the normal calibration range. If dilutions are required due to high sample

concentrations, the data are evaluated, but no flags are applied.

NOTES: 1) If only one of the recoveries for an MS/MSD pair is outside of the control limits, no qualification is necessary. Use professional judgment for the MS/MSD flags. 2) If the MS/MSD was performed by the laboratory on a non-project sample, no qualification is required. ACTION: MS/MSD flags only apply to the sample spiked. If the recoveries of the MS and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit but > 30%, qualify both positive results and non-detects (J). If the MS/MSD recovery is < 30% and the sample is non-detect, the results are considered unusable and flagged (R). ACTION: Laboratory control limits apply when spiked sample results fall within the normal calibration range. If dilutions are required due to high sample concentrations, the data is evaluated, but no flags are applied.

(S+D)/2 D = MSD sample result

ACTION: If the RPD exceeds the control limit, qualify both positive results and non-detects (J). Narrate non-compliance.

Where: S = MS sample result

x 100%

S-D

NOTE: RPD=

ACTION: Laboratory control limits apply when spiked sample results fall within the normal calibration range. If dilutions are required due to high sample concentrations, the data are evaluated, but no flags are applied.

Laboratory Duplicate Sample

7.0

7.1 Was a laboratory duplicate sample analyzed? If so, is the Laboratory Yes | No[~] N/A[] Duplicate Sample Form present?

Comments:

NOTE: MADEP refers to this sample as a "matrix duplicate".

ACTION: If not analyzed, qualification is not needed. If data is missing, contact laboratory for resubmission of report. Narrate non-compliance.

	7.2 Is the RPD between the mercury result for the laboratory duplicate sample and the result for the parent sample outside of the QA/QC limits?	Yes	No UNA[N/A [Comments:	
	MADEP Laboratory Duplicate Sample RPD Criteria:					
	For aqueous results > $5x$ RL, RPD must be $\pm 20\%$ 20 For aqueous results < $5x$ RL, RPD must be \le RL 20 For soil/sediment results > $5x$ RL, RPD must be $\pm 35\%$ 20 For soil/sediment results < $5x$ RL, RPD must be $\le 2x$ RL 20					
	ACTION : If the RPD exceeds the limits, qualify both positive results and nondetects as estimated and flag them J. Narrate non-compliance					
8.0	Sampling Accuracy					
	8.1 Were rinsate blanks collected? Prior to evaluating rinsate blanks, obtain a list of the associated samples from the senior chemist.	Yes	No No	N/A	Comments:	
	8.2 Do any rinseate blanks have positive results?	Yes []	No.	N/A [Comments:	
	ACTION: Evaluate rinseate results against blank results to determine if contaminant may be laboratory-derived. If results are not lab-related, qualify according to the table below.]			
	Sample conc. $< 5x$ blank value: Sample conc. $> 5x$ blank value: Flag sample result "U" No qualification is needed					
	NOTE: MADEP does not require the collection of rinseate blanks.					
9.0	Field Duplicates					
	9.1 Were field duplicate samples collected? Obtain a list of samples and their associated field duplicates.	Yes	No N	N/A[_]	Comments:	
	9.2 Were field duplicates collected per the required frequency?	Yes	No	N/A[\]	Comments:	
SC	SOW □ OAPP □ MADEP Option 1 (1 per 20) □ MADEP Option 3 (1 per 10) □					

Comments:		
N/A		ls 50%.
No		
Yes [ts if the RP
9.3 Was the RPD \leq 50% for soils or waters? Calculate the RPD for all results and Yes [_]	attach to this review.	ACTION: RPD must be ≤50% for soil and water. Qualify data (J) for both sample results if the RPD exceed

10.0 Application of Validation Qualifiers

If data tables have not been produced, apply data qualifiers directly to DQE Yes No No NA COmments: copy of laboratory report and flag pages for entry in database. no note flag senerated

REFERENCES

LAW, 1999, "Final Quality Assurance Project Plan, Olin Wilmington Property, 51 Eames Street, Wilmington, MA", LAW Engineering and Environmental Services, Kennesaw, GA 30144. August 1999 USEPA, 1988. "Laboratory Data Validation Functional Guidelines for Evaluating Organic and Inorganic Analysis," EPA/540/R-94-012 and EPA/540-R-94-013,

Standards for the Analysis of Mercury by Cold Vapor Atomic Absorption (CVAA) Spectrometry in Support of Response Actions under the Massachusetts Contingency Plan (MCP)" WSC-CAM, Section IIIB, Final, Revision No. 1, 1 July 2010. MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Quality Control Requirements and Performance

Hardness, TSS, Anicas Version 3, October 2008 Ammonia

WET CHEMISTRY PARAMETERS BY VARIOUS METHODS STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION **OLIN-WILMINGTON**

Sustace Jate

NASHBURN Sr. Review/Date | (Max 11200 - 1200 -6107120016 Reviewer/Date MIKL LA Project #

the QAPP does Note: The following analyses will be evaluated according to the "MADEP QA/QC Guidelines for Sampling, Data Evaluation and Reporting Activities." MADEP,

	however, may not list QA/QC criteria for every chemical analysis. Where not defined by MADEP, criteria will default to values stipulated in the QAPP. Where the (not define criteria, QA/QC requirements will default to limits employed by the laboratory.	DEP, criteria will default to values stipulated in the QAPP. Where the O
1.0	Laboratory Deliverable Requirements	
	1.1 Laboratory Information : Was all of the following provided in the laboratory report? Check items received.	Yes [] No [] N/A [] Comments:
	□ Name of Laboratory □ Address □ Project ID □ Phone # □ Client Information: □ Name □ Address □ Client Contact	Sample identification − Field and Laboratory (IDs must be cross-referenced)
ACT	ACTION: If no, contact lab for submission of missing or illegible information.	
	1.2 Laboratory Report Certification Statement	Yes [\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
	Does the laboratory report include a completed Analytical Report Certification in the required format?]
ACT	ACTION: If no, contact lab for submission of missing certification or certification with correct format.	rmat.
	1.3 Laboratory Case Narrative:	Yes [☑ No [] N/A [] Comments:
	$artilde{oldsymbol{ol{oldsymbol{ol}oldsymbol{ol{oldsymbol{ol}}}}}}}}}}}}}}}}}}}}}} $	Marrative includes an explanation of each discrepancy on the Certification Statement.
į		

ACTION: If no, contact lab for submission of missing or illegible information.

Yes [No [] 1.4 Chain of Custody (COC) copy present with all documentation completed?

N/A[

Does the laboratory report include copies of Chain of Custody forms containing all samples in this SDG?

NOTE: Olin receives and maintains the original COC.

ACTION: If no, contact lab for submission of copy of missing completed COC.

1.5 Sample Receipt Information (Cooler Receipt Form): Were each of the following tasks completed and recorded upon receipt of the sample(s) into the laboratory?

OLIN-WILMINGTON LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST WET CHEMISTRY PARAMETERS BY VARIOUS METHODS

		Yes [No	N/A	Comments:	
Sample temperature	Sample temperature confirmed: must be 1° – 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply). Container type noted ECondition observed D-pH verified (where applicable) EField and lab IDs cross referenced	n the same d S cross refer	ay as collecti enced	on, temperatu	re requirement does not	apply).
ACTION: If no, conta 1.5.1 Ammonia,— Oil & Grease	 ACTION: If no, contact lab for submission of missing or incomplete documentation. 1.5.1 Were the correct bottles and preservatives used? Ammonia,—1 Liter polyethylene/H₂SO₄ to pH<2,cool to 4°C Oil & Grease—1 Liter glass/HCL or H2SO4 to pH<2,cool to 4°C 	Yes [No []	No.	N/A	Comments:	
Alkalinity –	Alkalinity – 1 Liter polyethylene/cool to 4°C					
Chloride, pE	Chloride, pH, sulfate, nitrate, nitrite - 50 mL polyethylene/cool to 4°C					
Nitrate/nitrit	Nitrate/nitrite - H2SO4 to pH<2,cool to 4°C					
Organic Car	Organic Carbon – 500 mL amber glass bottle/HCl or H ₂ SO ₄ to pH<2,cool to 4°C Sulfide 50 mJ notyrethylene/7n Acetate + NaOH to nH>0 cool to 4°C					
Phenolics - I	Phenolics - H_2SO_4 to $pH<2$, cool to $4^{\circ}C$					
Specific con	Specific conductance, TDS, TSS – 100 mL polyethylene/cool to 4°C					
ACTION: If no, container/volume (if temperature exceeds	ACTION: If no, inform senior chemist. Document justification for change in container/volume (if applicable), qualify positive and non-detect data (J) data if cooler temperature exceeds 10°C. Rejection of data requires professional judgment					
1.5.2	Were all samples delivered to the laboratory without breakage?	Yes [W	No	N/A	Comments:	
1.5.3	Does the Cooler Receipt Form or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data?	Yes	No [NA [N/A [Comments:	

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1.6 Sample Results Section: Was the following information supplied in the laboratory

героп юг еасп sample с	п sample?		Yes V	N/A Comments:	
Field ID and Lab ID A. Clean-up method Matrix ACTION: If no, contact I.	Field ID and Lab ID	E Analyst Initials Preparation method ions nplete information.	☐ Dilution Factor ☐ Dilution Factor ☐ Date of preparation/extraction/digestion cled☐ Units (soils must be reported in dry weight)	oisture or solids an-up and analysis, where	applicable
1.7 QA/QC Informati for each sample batch?	1.7 QA/QC Information: Was the following information provided in the laboratory report for each sample batch?	tion provided in the laboratc	ory report Yes No	N/A [] Comments:	
☐ Method blank results	TCS recoveries TMS/MSD	☐ MS/MSD recoveries and RPDs □ La	\square Laboratory duplicate results (where applicable)	plicable)	
ACTION: If no, contact la	ACTION: If no, contact lab for submission of missing or incomplete information.	nplete information.			
2.0 Holding Times			Yes No IV	N/A Comments:	
Have any technic	al holding times, determined from d	ate of collection to date of a	Have any technical holding times, determined from date of collection to date of analysis, been exceeded? The holding times are as follows:	ng times are as follows:	
28 days = ammonia, Alkalinity = 14 days	mmonia, chemical oxygen demand,	lemand, chloride, organic carbon, oi Sulfide, TDS, TSS = 7 days	28 days = ammonia, chemical oxygen demand, chloride, organic carbon, oil & grease, specific conductance, total organic carbon and sulfate Alkalinity = 14 days Sulfide, TDS, TSS = 7 days pH = analyze immediately Nitrate nitrogen as N = 4	tal organic carbon and sulfate Nitrate nitrogen as $N = 48$ hrs	
Nitrite nitro	=48 hrs	Nitrate + Nitrite as $N = 28$ days			
NOTE: List samp	NOTE: List samples that exceed hold time with # of days exceeded on checklist	ays exceeded on checklist			
ACTION: If technical holdii judgment used to qualify soils.	ACTION: If technical holding times are exceeded qualify results (J) judgment used to qualify soils.	sults (J). For water samples	that are grossly exceeded (>2X ho	. For water samples that are grossly exceeded (>2X hold time) reject (R) all non-detect results. Pr	Professional
3.0 Laborato	Laboratory Method		Yes [No []	N/A [\] Comments:	
3.1 Was the corre	3.1 Was the correct laboratory method used?				
ACTION: If no, contact la	b to provide justification for method	change compared to the requ	ested method. Contact senior chemis	ACTION: If no, contact lab to provide justification for method change compared to the requested method. Contact senior chemist to inform Client of change or to request variance.	nce.

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by the Yes [No [N/A [] Comments:	2.	Bicarbonate Alkalinity** $\square = 1 \text{ mg/L}$ Carbonate Alkalinity** $\square = 1 \text{ mg/L}$	Chloride* $\Box = 1 \text{ mg/L}$ Hardness * $\Box = 2 \text{ mg/L}$	Oil & Grease* $\square = 5.5 \text{ mg/L}$ Sulfate (EPA 300.0)* $\square = 2 \text{ mg/L}$	$TDS* \square = 10 \text{ mg/L}$ $TSS* \square = 5 \text{ mg/L}$	Source of PQL = QAPP	Source of PQL =	ACTION: If no, evaluate change with respect to sample matrix, preparation, dilution, moisture, etc. If sample PQL is indeterminate, contact lab for explanation. 3.3 Are the appropriate parameter results present for each sample in the SDG? Yes Molinion indeterminate, contact lab for explanation.	ACTION: If no, check Request for Analysis to verify if method was ordered and COC to verify that it was sent, and contact lab for resubmission of the missing data	Yes [No [] N/A [] Comments:		Yes [No [] N/A [] Comments:			
a limits the same as those specified by the	Note: The MADEP QA/QC Guidelines do not yet list PQLs for wet chemistry analyses, therefore all criteria will default to values stipulated in the QAPP*. Where the QAPP does not define criteria, QA/QC requirements default to limits employed by the lab**. Other criteria may also apply.	Alkalinity** $\square = 1 \text{ mg/L}$ Bicarbonate /	Nitrite Nitrogen as N* $\square \leq .01 \text{ mg/L}$	Total Organic Carbon** $\square = 1 \text{ mg/L}$ Oil & Greass	COD* High - $50 \text{ mg/L} \square$ TDS* $\square = 1$	$PQL = \frac{O \cdot O}{O \cdot O}$	PQL =	4: If no, evaluate change with respect to sample matrix, preparation, dilution, moisture, etc. If sample PC 3.3 Are the appropriate parameter results present for each sample in the SDG? Yes Y	to verify if method was ordered and COC to verify that it was sent, a		лт.	Yes [V]	es present? ission of missing data.	4.2 Was a method blank analyzed for each analysis batch of wet chemistry field samples of	
3.2 Are the practical quantitation □AQAPP/IRSWP □ Lab?	Note: The MADEP QA/QC Guideli therefore all criteria will default to val define criteria, QA/QC requirements may also apply.	Ammonia* $\square = 0.1 \text{ mg/ L}$	Nitrate Nitrogen as N* 🖂= .05 mg/L	Spec. Cond.** □ 3 umhos/cm	COD:* Low -20 mg/L	Other parameter(list) here be	Other parameter(list)	ACTION: If no, evaluate change with respectable. 3.3 Are the appropriate parameter re	ACTION: If no, check Request for Analysis	$3.4~{ m If}$ dilutions were required, were dilution factors reported?	ACTION: If no, contact the lab for submission.	4.0 <u>Method Blanks</u>	4.1 Are the Method Blank Summaries present? ACTION: If no, call the laboratory for submission of missing data.	4.2 Was a method blank analyzed 1	

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LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST WET CHEMISTRY PARAMETERS BY VARIOUS METHODS **OLIN-WILMINGTON**

onsult senior chemist for action needed.	Yes [No [] N/A [] Comments:	alify data Yes [] No [] N/A [] Comments:		g level (flagging level = $5 \times \text{blank}$ value) on the checklist. List all affected samples and the		ch of 20 Yes [\(\frac{1}{\chi} \) No [] N/A [] Comments:	ofessional	Yes [No [] N/A [] Comments:		Yes $[]$ No $[\mathcal{A}]$ N/A $[]$ Comments:
ACTION: If no, document discrepancy in case narrative and contact lab for justification. Consult senior chemist for action needed.	4.3 Is the method blank less than the PQL? (See Section 3.2 for PQLs).	4.4 Do any method blanks have positive results for wet chemistry parameters? Qualify data according to the following: If the sample concentration is < 5 × blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.	If the sample concentration is $> 5 \times \text{blank}$ value, no qualification is needed.	ACTION: If any blank has positive results, list all the concentrations detected and flagging level (flagging level = 5 × blank value) on the checklist. List all affected samples and their qualifiers.	5.0 <u>Laboratory Control Standards</u>	5.1 Was a laboratory control standard (LCS) run with each analytical batch of 20 samples or less?	ACTION : If no, call laboratory for LCS form submittal. If data is not available, use professional judgment to determine qualification actions for data associated with the batch.	5.2 Is a LCS Summary Form present?	ACTION: If no, contact lab for resubmission of missing data.	5.3 Is any wet chemistry analyte LCS recovery outside the control limits?

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Alkalinity** $\square = 80-120\%$ Bic Total Organic Carbon** $\square = 80-120\%$ TD COD Low* $\square = 80-120\%$ CC Hardness* $\square = 80-120\%$ Chl	Bicarbonate Alkalimity** $\square = 80-120\%$ TDS** $\square = 80-120\%$ COD High* $\square = 80-120\%$ Chloride* $\square = 80-120\%$	Carbonate Alkalinity** $\square = 80-120\%$ Oil & Grease* $\square = 80-120\%$ Nitrate Nitrogen as N*** $\square = 80-120\%$ Sulfate (EPA 300.0)* $\square = 80-120\%$	$\Box = 80-120\%$ 1-120% $N^**\Box = 80-120\%$ $\Box = 80-120\%$	Specific Conductivity * \square = 80-120% Ammonia Nitrogen as N* \square < 80-120% Nitrite Nitrogen as N** \square = 80-120% pH* \square = 98-102%	= 80-120% E= 80-120% Z= 80-120% TSS* NA
Other parameter(list) hrom: Le	$\frac{9.0R}{9.0R} = \frac{9.0}{9.0R}$	21-08	Rec Limits= 2,	arpp	
	(MADEP has not yet defined LCS recovery limits for wet chemistry analyses.)	ry limits for wet chem	istry analyses.)		
ACTION: If recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit, qualify all positive and no-detect results are rejected (R).	ulify all positive sample results within the bar-detect results are rejected (R).	atch as (J). If recovery	is below the lower lii	nit, qualify all positive and	no-detect results
6.0 <u>Matrix Spikes</u>					
Matrix spikes may be collected at different frequencies based on monthly, quarterly, or task specific schedules. Confirm spike requirements for each set with the senior chemist.	quencies based on monthly, quarterly, or sor each set with the senior chemist.		0 C-5 W- EDSP/547-XXX	15-7-84	
6.1 Were project-specific MS/MSDs analyzed? List pr ACTION: If no, contact senior chemist to see if any were specified.	Were project-specific MS/MSDs analyzed? List project samples that were spiked contact senior chemist to see if any were specified.	Yes [\int	No [] N/A []	Comments:	
6.2 Is the MS/MSD Recovery Form present? ACTION: If no, contact lab for resubmission of missing data.	oresent? ssing data.	Yes	No [] N/A []	Comments:	
6.3 Were matrix spikes analyzed at the matrix?	Were matrix spikes analyzed at the required frequency of 1 per 20 samples per matrix?	Yes [No[] N/A[]	Comments:	
ACTION: If any matrix spike data is missing, call lab for resubmission.	ab for resubmission.				
		Yes	No L	Comments:	

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	spike re
	analyte
	chemistry
	y wet o
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,	6.4

NOTE:
$$\%R = (\underline{SSR-SR}) \times 100\%$$
 Where: SA

SA = Spike added

result

Sample sample

result

Spiked

SSR

MS/MSD Recovery Limits:

Alkalinity* = NA

Alkalinity* = NA

Alkalinity* = NA

Alkalinity* = NA

Carbonate alkalinity* = NA

Chloride*(SM 4500 CI)
$$\square$$
= 75-125%

Chloride*(SM 4500 CI) \square = 75-125%

CoD Low* \square = 75-125%

Nitrite Nitrogen as N** \square = 75-125%

Nitrite Nitrogen as N** \square = 75-125%

Nitrite Nitrogen as N** \square = 75-125%

Nitrite Nitrogen as N** \square = 75-125%

Nitrite Nitrogen as N** \square = 75-125%

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Nitrite Nitrogen as N** \square = 75-125%

Nitrite Nitrogen as N** \square = 75-125%

Nitrite Nitrogen as N** \square = 75-125%

Nitrite Nitrogen as N** \square = 75-125%

Ammonia* (LACHAT) \square = 75-125%

Nitrite Nitrogen as N** \square = 75-125%

Nitrite Nitrogen as N** \square = 75-125%

Nitrite Nitrogen as N** \square = 75-125%

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Nitrite Nitrogen as N** \square = 75-125%

Nitrite Nitrogen as N** \square = 75-125%

Nitrogen as N** \square = 75-125%

Nitrogen as N** \square = 75-125%

Nitrogen

NOTES: 1) If only one of the recoveries for an MS/MSD pair is outside of the control limits, no qualification is necessary. Use professional judgment for the MS/MSD flags. 2) If the MS/MSD was performed by the laboratory on a non-project sample, no qualification is required. ACTION: MS/MSD flags only apply to the sample spiked. Do not evaluate if sample concentration is > 4X spike. If the recoveries of the MS and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit but > 30%, qualify both positive results and non-detects (J). If the MS/MSD recovery is < 30% and the sample is non-detect, the results are considered unusable and flagged (R).

ACTION: Laboratory control limits apply when spiked sample results fall within the normal calibration range. If dilutions are required due to high sample concentrations, the data is

Comments: N/A[No 6.5 Are any RPDs for MS/MSD recoveries outside of the QA/QC limits? D = MSD resultWhere S = MS result x 100% (S + D)/2NOTE: RPD = S - Devaluated, but no flags are applied.

MS/MSD RPD Limits:

RPD ≤ 20

Laboratory Duplicate 7.0

Are the RPDs for the laboratory duplicates <20% unless otherwise specified below?

Comments: N/A[Yes No

Page 7 of 9

hat analyte as estimated (J).	TSS** □ = 6%
r than specified limits, qualify all results for t	Specific Conductivity $*\Box = 5\%$
ACTION: If the RPD is greate	$pH^* \square = 3\%$

 $\%9 = \square **SQI$

8.0 Sampling Accuracy

The majority of ground water samples are collected directly from a tap, process stream, or with dedicated tubing. Rinse blanks will not be collected.

8.1 Were rinsate blanks collected? Prior to evaluating rinsate blanks, obtain a list of the
$$Yes[\]$$
 No $[\]$ N/A $[\]$ Comments: associated samples from the senior chemist.

Comments:

N/A Z

No [

Yes

If the sample concentration is $> 5 \times \text{blank}$ value, no qualification is needed.

NOTE: MADEP does not require the collection of rinsate blanks.

9.0 Field Duplicates

- Comments: Comments: N/A [Y]N/A [] No No [< Yes [] Yes [] Were field duplicate samples collected? Obtain a list of samples and their associated 9.2 Were field duplicates collected per the required frequency? field duplicates. 9.1
- N/A[\(\' No [] Yes [] 9.3 Was the RPD \leq 30% for waters \leq 50% for soils? Calculate the RPD for results and attach to this review.

MADEP Option 3 (1 per 10)

MADEP Option 1(1 per 20)

QAPP/IRSWP

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exceeded
RPD
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sample
both sa
for
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data
Qualify
JON: O
ACTI

Was any of the data qualified?	Yes [\$ [Z	N/A[]	Comments:	
If so, apply data qualifiers directly to the DQE copy of laboratory report and flag pages for entry in database.					

REFERENCES:-

MACTEC, 2007. "Draft Interim Response Steps Work Plan"; Olin Chemical Superfund Site, 51 Eames Street, Wilmington, Massachusetts.; Project No. 6300-06-0010/41.1; July 25, 2007. MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Compendium of Quality Control Requirements and Performance Standards for Selected Analytical Protocols, "WSC-CAM #10-320, Final, Revision No. 1, 5 July 2010.

MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data in Support of Action Conducted Under the Massachusetts Contingency Plan (MCP)," WSC-CAM, Section VIIA, Final, Revision No. 1, 1

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WET CHEMISTRY PARAMETERS BY VARIOUS METHODS STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION OLIN-WILMINGTON

プース 20 Reviewer/Date Mile WASHGuan Lab Report # 360-4/1203-1 Project # 610 + 120016 Sr. Review/Date

SEDINFRI

The following analyses will be evaluated according to the "MADEP QA/QC Guidelines for Sampling, Data Evaluation and Reporting Activities." MADEP, QAPP does Note:

	however, may not list QA/QC criteria for every chemical analysis. Where not defined by MADEP, criteria will default to values stipulated in the QAPP. Where the not define criteria, QA/QC requirements will default to limits employed by the laboratory.	DEP, criteria will default to values stipulated in the QAPP. Where the
1.0	Laboratory Deliverable Requirements	
	1.1 Laboratory Information: Was all of the following provided in the laboratory report? Yes [No [] Check items received.	Yes [No [] N/A [] Comments:
	☐ Name of Laboratory ☐ Address ☐ Project ID ☐ Phone #	Sample identification – Field and Laboratory
ACT	Client Information: ACTION: If no, contact lab for submission of missing or illegible information.	(IDs must be cross-referenced)
	1.2 Laboratory Report Certification Statement	Yes [v] No [] N/A [] Comments:
	Does the laboratory report include a completed Analytical Report Certification in the required format?]
ACT	ACTION: If no, contact lab for submission of missing certification or certification with correct format.	rmat.
	1.3 Laboratory Case Narrative:	Yes [\(\sum \) No [] N/A [] Comments:
	$ec{B}$ Narrative serves as an exception report for the project and method QA/QC performance.	EVarrative includes an explanation of each discrepancy on the Certification Statement.
ŀ		

ACTION: If no, contact lab for submission of missing or illegible information.

Comments: N/A[] Yes [No [] 1.4 Chain of Custody (COC) copy present with all documentation completed?

Does the laboratory report include copies of Chain of Custody forms containing all samples in this SDG?

NOTE: Olin receives and maintains the original COC.

ACTION: If no, contact lab for submission of copy of missing completed COC.

1.5 Sample Receipt Information (Cooler Receipt Form): Were each of the following tasks completed and recorded upon receipt of the sample(s) into the laboratory?

ANIONS, AMMONIA, TOC

OLIN-WILMINGTON LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST WET CHEMISTRY PARAMETERS BY VARIOUS METHODS \$\int \times \int \times \times \int \t

Comments:

N/A[]

No []

□Sample temperature confirmed: must be 1° – 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply).	e requirement does not apply).
☐ Container type noted ☐ Condition observed ☐ pH verified (where applicable) ☐ Field and lab IDs cross referenced	
ACTION: If no, contact lab for submission of missing or incomplete documentation.	
Ammonia,— 1 Liter polyethylene/H ₂ SO ₄ to pH<2, cool to 4°C Yes [Y No [] N/A [] Comme	Comments:
Oil & Grease – 1 Liter glass/HCL or H2SO4 to pH<2, cool to 4°C	
Alkalinity – 1 Liter polyethylene/cool to 4°C	
Chemical Oxygen Demand – 50 mL polyethylene/H ₂ SO ₄ to pH<2,cool to 4°C	
Chloride, pH, sulfate, nitrate, nitrite - 50 mL polyethylene/cool to 4°C	
Nitrate/nitrite - H2SO4 to pH<2,cool to 4°C	

ACTION: If no, inform senior chemist. Document justification for change in container/volume (if applicable), qualify positive and non-detect data (J) data if cooler temperature exceeds 10°C. Rejection of data requires professional judgment

Organic Carbon – 500 mL amber glass bottle/HCl or $\rm H_2SO_4$ to pH<2,cool to 4°C

Sulfide - 50 mL polyethylene/ZnAcetate + NaOH to pH>9, cool to 4°C

Specific conductance, TDS, TSS – 100 mL polyethylene/cool to 4°C

Phenolics - H₂SO₄ to pH<2,cool to 4°C

N/A Yes [No [] Were all samples delivered to the laboratory without breakage? 1.5.2

Comments:

Comments: N/A[] No S sample receipt, condition of the samples, analytical problems or special Yes [] Does the Cooler Receipt Form or Lab Narrative indicate other problems with circumstances affecting the quality of the data? 1.5.3

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WET CHEMISTRY PARAMETERS BY VARIOUS METHODS STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION OLIN-WILMINGTON

1.6 Sample Results Section: Was the following information supplied in the laboratory

report for each sample?	ch sample?		Yes [Y No [N/A [] Comments:
Field ID and Lab ID All Clean-up method Antrix ACTION: If no, contact	Field ID and Lab ID	Analyst Initials Preparation method tions mplete information.	西が Dilution Factor	世 Dilution Factor
1.7 QA/QC Informati for each sample batch?	$1.7~\mathrm{QA/QC}$ Information: Was the following information provided in the laboratory report for each sample batch?	ıtion provided in the laboratı	ory report Yes [No []	N/A [] Comments:
☐ Method blank results	ELCS recoveries E MS/MSD	MS/MSD recoveries and RPDs	Laboratory duplicate results (where applicable)	plicable)
ACTION: If no, contact 1	ACTION: If no, contact lab for submission of missing or incomplete information.	nplete information.		
2.0 Holding Times			Yes No Ly	N/A Comments:
Have any technic	Have any technical holding times, determined from date of collection to date of analysis, been exceeded? The holding times are as follows:	late of collection to date of a	inalysis, been exceeded? The holdii	ng times are as follows:
28 days = a	28 days = ammonia, chemical oxygen demand, chloride, organic carbon, oil & grease, specific conductance, total organic carbon and sulfate	chloride, organic carbon, oi	1 & grease, specific conductance, to	ital organic carbon and sulfate
Alkalinity = 14 days		Sulfide, TDS, TSS = 7 days	pH = analyze immediately	Nitrate nitrogen as $N = 48$ hrs
Nitrite nitro	Nitrite nitrogen as $N = 48 \text{ hrs}$ Nitrate	Nitrate + Nitrite as $N = 28$ days		
NOTE: List sam	NOTE: List samples that exceed hold time with # of days exceeded on checklist	lays exceeded on checklist		
ACTION: If technical holdi judgment used to qualify soils.	ACTION: If technical holding times are exceeded qualify results (J) judgment used to qualify soils.	esults (J). For water sample:	s that are grossly exceeded (>2X ho	. For water samples that are grossly exceeded (>2X hold time) reject (R) all non-detect results. Professional
3.0 Laborat	Laboratory Method		Yes [No [N/A [] Comments:
3.1 Was the corre	3.1 Was the correct laboratory method used?			

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ACTION: If no, contact lab to provide justification for method change compared to the requested method. Contact senior chemist to inform Client of change or to request variance.

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ACT	ACTION: If no, document discrepancy in case narrative and contact lab for justification. Consult senior chemist for action needed.	nemist for	action need	ed.		
	4.3 Is the method blank less than the PQL? (See Section 3.2 for PQLs). $ m extbf{Y}$	Yes [V	No.	N/A	Comments:	
	4.4 Do any method blanks have positive results for wet chemistry parameters? Qualify data according to the following: If the sample concentration is $< 5 \times$ blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.	Yes	No [N/A	Comments:	
	If the sample concentration is $> 5 \times \text{blank}$ value, no qualification is needed.					
ACTION qualifiers.	ACTION : If any blank has positive results, list all the concentrations detected and flagging level (flagging level = $5 \times \text{blank}$ value) on the checklist. List all affected samples and their qualifiers.	ıg level =	5 × blank v	alue) on the c	hecklist. List all affected samples and	nd their
5.0	Laboratory Control Standards					
	5.1 Was a laboratory control standard (LCS) run with each analytical batch of 20 Y samples or less?	Yes	No	N/A[]	Comments:	
ACT judgn	ACTION: If no, call laboratory for LCS form submittal. If data is not available, use professional judgment to determine qualification actions for data associated with the batch.					

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Comments:

N/A

Yes [V No []

Comments:

Yes No IS N/A

Is any wet chemistry analyte LCS recovery outside the control limits?

5.3

ACTION: If no, contact lab for resubmission of missing data.

Is a LCS Summary Form present?

5.2

WET CHEMISTRY PARAMETERS BY VARIOUS METHODS STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION **OLIN-WILMINGTON**

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_	2	3
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۲	-	=
7	1	7
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Alkalinity** $\square = 80-120\%$	Bicarbonate Alkalinity** $\square = 80-120\%$	Carbonate Alkalinity** □ = 80-120%	Specific Conductivity $*\square = 80-120\%$
Total Organic Carbon** $\Box = 80-120\%$ TDS** $\Box = 80-120\%$	$TDS** \square = 80-120\%$	Oil & Grease* $\square = 80-120\%$	Ammonia Nitrogen as $N^* \square = 80-120\%$
COD Low* $\Box = 80-120\%$	COD High* $\Box = 80-120\%$	Nitrate Nitrogen as $N^**E = 80-120\%$	Nitrite Nitrogen as N** \square = 80-120%
$Hardness^* \square = 80-120\%$	Chloride* ☐= 80-120%	Sulfate (EPA 300.0)* \Box = 80-120%	$pH^* \square = 98-102\%$ TSS* NA
Other parameter (list)	1, de %R=	80-120 TRec Limits QAPF	406
Other parameter(list)	%R =	Rec Limits =	

(MADEP has not yet defined LCS recovery limits for wet chemistry analyses.)

ACTION: If recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit, qualify all positive and no-detect results within the batch as (J). If LCS recovery is <10%, non-detect results are rejected (R).

Matrix Spikes 0.9

Matrix spikes may be collected at different frequencies based on monthly, quarterly, or task specific schedules. Confirm spike requirements for each set with the senior chemist.

- Yes 🗾 Were project-specific MS/MSDs analyzed? List project samples that were spiked. 6.1
 - ACTION: If no, contact senior chemist to see if any were specified
- Is the MS/MSD Recovery Form present? 6.2

ACTION: If no, contact lab for resubmission of missing data.

- N/A No[] Yes [V Were matrix spikes analyzed at the required frequency of 1 per 20 samples per matrix? 6.3

ACTION: If any matrix spike data is missing, call lab for resubmission.

Comments:	Comments:
N/A	N/A
No	No
Yes [V]	Yes [V

Comments:

OC-50-E050/524-XXX

Comments: N/AYes No

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WET CHEMISTRY PARAMETERS BY VARIOUS METHODS STANDARD OPERATING PROCEDURE AND CHECKLIST LEVEL I DATA QUALITY EVALUATION OLIN-WILMINGTON

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wet cho
Are any
6.4

NOTE:
$$\%R = (SSR-SR) \times 100\%$$

S.A $SA = Spike added$

result result

Spiked

II

SSR

Where:

Sample sample

MS/MSD Recovery Limits:

Alkalinity* = NA

Carbonate alkalinity* = NA

Chloride*(SM 4500 CI)
$$\square$$
= 75-125%

Chloride*(SM 4500 CI) \square = 75-125%

CoD Low* \square = 75-125%

Oil & Grease* = NA

Oil & Grease* = NA

Nitrite Nitrogen as N*** \square = 75-125%

CoD High* \square = 75-125%

Nitrite Nitrogen as N*** \square = 75-125%

NOTES: 1) If only one of the recoveries for an MS/MSD pair is outside of the control limits, no qualification is necessary. Use professional judgment for the MS/MSD flags. 2) If the MS/MSD was performed by the laboratory on a non-project sample, no qualification is required. ACTION: MS/MSD flags only apply to the sample spiked. Do not evaluate if sample concentration is > 4X spike. If the recoveries of the MS and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit but > 30%, qualify both positive results and non-detects (J). If the MS/MSD recovery is < 30% and the sample is non-detect, the results are considered unusable and flagged (R). ACTION: Laboratory control limits apply when spiked sample results fall within the normal calibration range. If dilutions are required due to high sample concentrations, the data is evaluated, but no flags are applied.

NOTE: RPD =
$$\frac{S - D}{(S + D)/2}$$
 x 100% Where S = MS result
$$\frac{A \cdot A \cdot B}{(S + D)/2}$$

$$D = MSD \text{ result}$$

Comments:

N/A

MS/MSD RPD Limits:

Laboratory Duplicate 7.0

Are the RPDs for the laboratory duplicates <20% unless otherwise specified below?

No NA Yes [

OLIN-WILMINGTON LEVEL I DATA QUALITY EVALUATION STANDARD OPERATING PROCEDURE AND CHECKLIST

			WE	T CHEMISTRY PA	WET CHEMISTRY PARAMETERS BY VARIOUS METHODS	ARIOUS IV	IETHODS			
ACT	ION: If the RPD is	s greater than	ACTION: If the RPD is greater than specified limits, qualify all results for that analyte as estimated (J).	all results for that an	alyte as estimated (J).					
	$pH^* \ \square = 3\%$		Specific Conductivity *□	<i>y</i> *□ = 5%	%9 = □ **SSL		Г	%9 = □ **SŒL	١٥	
8.0	Sampling Accuracy	<u>uracy</u>								
The with	The majority of ground with dedicated tubing.	nd water san . Rinse bla	The majority of ground water samples are collected directly from a tap, process stream, or with dedicated tubing. Rinse blanks will not be collected.	rectly from a tap, p ed.	rocess stream, or					
	8.1 Were rinsa associated samp	ate blanks co ples from the	8.1 Were rinsate blanks collected? Prior to evaluating associated samples from the senior chemist.		rinsate blanks, obtain a list of the	Yes	No [N	N/A []	Comments:	
	8.2 Do any rins	sate blanks hæ	8.2 Do any rinsate blanks have positive results?			Yes	No [N/A[-	Comments:	
ACI	TON: Evaluate r	insate result	ACTION: Evaluate rinsate results vs. blank results to determine if contaminant may be laboratory-derived. If not lab-related, qualify according to the table below.	letermine if contarr	inant may be labor	atory-derive	ed. If not la	ıb-related, qı	talify according to	the table below.
	If the sample c	concentration	If the sample concentration is $> 5 \times \text{blank}$ value, no qualification is needed.	g sample result non-d qualification is neede	letect "U" at the PQL ed.	or the conce	ntration repo	nted 11 greatei	than the PQL.	
NOT	E: MADEP does	not require	NOTE: MADEP does not require the collection of rinsate blanks.	e blanks.						
9.0	Field Duplicates	<u>is</u>								
	9.1 Were field du field du field duplicates.	eld duplicate cates.	Were field duplicate samples collected? Obtain a ld duplicates.	ain a list of samples	list of samples and their associated	Yes	No C.	N/A[]	Comments:	
	9.2 Were field	1 duplicates c	9.2 Were field duplicates collected per the required frequency?	frequency?		Yes [No	N/A[V	Comments:	
0	QAPP/IRSWP	MADEP C	MADEP Option 1(1 per 20) □	MADEP Option 3 (1 per 10) 🛘	(1 per 10) 🏻					
	9.3 Was the RPD \leq 30% attach to this review.	PD \leq 30% fo review.	9.3 Was the RPD \leq 30% for waters \leq 50% for soils? Calculate the RPD for results and attach to this review.	? Calculate the RP	D for results and	Yes	No [N/A[Comments:	

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Qualify
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Was any of the data qualified?	Yes [No [N/A []	Comments:	
If so, apply data qualifiers directly to the DQE copy of laboratory report and flag pages for entry in database.					

REFERENCES:

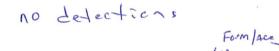
MACTEC, 2007. "Draft Interim Response Steps Work Plan"; Olin Chemical Superfund Site, 51 Eames Street, Wilmington, Massachusetts.; Project No. 6300-06-0010/41.1; July 25, 2007. MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Compendium of Quality Control Requirements and Performance Standards for Selected Analytical Protocols," WSC-CAM #10-320, Final, Revision No. 1, 5 July 2010.

MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data in Support of Action Conducted Under the Massachusetts Contingency Plan (MCP)," WSC-CAM, Section VIIA, Final, Revision No. 1, 1 July 2010.

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PROJECT CHEMIST REVIEW RECORD
Method: 8315A Formaldeh, Le Acetaldeh, de, LC65 Ph thatic
Laboratory and Lot: TAL 360-41203
Date: 9/5/2012
Reviewer: M. Ke Was HBURN
1. Case Narrative
2. Holding time and Sample Collection Within QC Limits
3. QC Blanks



4. Laboratory Control Sample Results (80-120) (60-140)

within ac limits

Surrogate (if applicable)

NA

6. Field Duplicate Precision

NA

7. Matrix Spike Results (if applicable) (75-125) (60-140) Acetaldehyde - 70/69

8. Reporting Limits and Data Completeness

Verified

Quality Control Results

Client: Olin Corporation

Job Number: 360-41203-1

Sdg Number: 360-41203-1

Laboratory Control/

Laboratory Duplicate Data Report - Batch: 640-93608

Method: 8315A

Preparation: 8315_S_Prep

LCS Lab Sample ID:

LCS 640-93608/2-A

Units: ug/Kg

LCSD Lab Sample ID: LCSD 640-93608/3-A

Client Matrix:

Solid 1.0

Client Matrix: Dilution:

Solid 1.0

Dilution: Analysis Date:

06/21/2012 1138

Analysis Date:

06/21/2012 1150

Prep Date:

06/21/2012 0746

Prep Date:

06/21/2012 0746

Leach Date:

N/A

Leach Date:

N/A

Analyte	LCS Spike Amount	LCSD Spike Amount	LCS Result/Qual	LCSD Result/Qual
Formaldehyde	750	750	776	805
Acetaldehyde	750	750	677	697

Matrix Spike/

Matrix Spike Duplicate Recovery Report - Batch: 640-93608

Method: 8315A

Preparation: 8315_S_Prep

MS Lab Sample ID: Client Matrix: Dilution: Analysis Date: Prep Date: Leach Date:

360-41203-1 Solid

1.0 06/21/2012 1214

06/21/2012 0746

Analysis Batch:

Analysis Batch:

Prep Batch:

Leach Batch:

640-93636 Prep Batch: 640-93608 Leach Batch: N/A

N/A

640-93636

640-93608

Lab File ID: Initial Weight/Volume: Final Weight/Volume:

Instrument ID:

1F21M7.d 20.0 g 4.0 mL

Injection Volume:

10 uL

LCM

MSD Lab Sample ID:

Client Matrix:

Analysis Date:

Dilution:

360-41203-1 Solid

1.0 06/21/2012 1226

06/21/2012 0746

N/A

Instrument ID: Lab File ID:

Initial Weight/Volume: Final Weight/Volume: Injection Volume:

1F21M8.d 20.4 g 4.0 mL 10 uL

LCM

Analyte

Prep Date:

Leach Date:

% Rec.

MSD Limit

RPD RPD Limit 30

30

MS Qual

MSD Qual

Formaldehyde Acetaldehyde

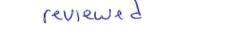
95 101 70 69

MS

31 - 131 30 - 130 2 2

MJW 9/6/12

PROJECT CHEMIST REVIEW RECORD
Method: 8315A MOD - Hydrazin
Laboratory and Lot: OLN 78
Date: 9/7/12
Reviewer: Mke Was Whun
1. Case Narrative



2. Holding time and Sample Collection





4. Laboratory Control Sample Results (70 -130)



5. Surrogate (if applicable)

NA

6. Field Duplicate Precision

rix Spike Results (if applicable) (40-140)

Methyl hydrazine (MMH) - 6/6

to judgment

1, 1 - dim etyl hydrazine (uDMH) - 14/16

ting Limits and Data Completeness NA 7. Matrix Spike Results (if applicable) (40-140)

8. Reporting Limits and Data Completeness

Verified



Quality Control Summary Matrix Spike/Matrix Spike Duplicate

SDG: OLN78 Matrix: SOLID

Specialty Services Group Fraction: Hydrazines by LC/MS/MS

UNSPK: 6695248	Batch: 121	73001 (Sampl	le number(s)	: 6695248)					
MS: 6695248	Spike	Unspiked	MS	MSD					
MSD: 6695248	Added	Conc	Conc	Conc	MS	MSD	%Rec		%RPD
Analyte	ng/g	ng/g	ng/g	ng/g	%Rec	%Rec	Limits	%RPD	Limits
Hydrazine	120	1.14	86.84	85.64	71	70	11-102	1	30
Methýlhydrazine	600	N.D.	38.86	36.39	6 *	6 *	10-92	7	30
1,1-Dimethylhydrazine	600	N.D.	85.47	97.3	14	16	10-116	13	30
									•

Results are being reported on an as received basis.

7/3/2012 10:46:27 AM



2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 • 717-656-2300 Fax; 717-656-2681 • www.lancasterlabs.com

Type I Data Package

Prepared for:

Olin Corporation

Suite 200 3855 North Ocoee Street Cleveland TN 37312

Project: Olin Wilmington, MA / 6107120016 Water Sample Collected on 06/18/12

SDG# OLN77

GROUP1316839 **SAMPLE NUMBERS**6693008

PA Cert. # 36-00037 NY Cert. # 10670 NJ Cert. # PA011 NC Cert. # 521

TX Cert. # T104704194-08A-TX

Through our technical processes and second person review of data, we have established that our data/deliverables are in compliance with the methods and project requirements unless otherwise noted or previously resolved with the client.

Authorized by:

Dana M. Kauffman

Koma m Karffman

Manager

Date: 07/09/2012

CHECKED FOR COMPLETENESS CHOP PARAMETERS ORDERED BY:

Any questions or concerns you might have regarding this data package should be directed to your client representative, Nicole Maljovec at Ext. 1537.

PROJECT CHEMIST REVIEW RECORD Method: SW 8033M - DMF Laboratory and Lot: Karadin Date: 9 6 12 Reviewer: Mike Washburn 1. Case Narrative Reviewed

2. Holding time and Sample Collection

within limits

3. QC Blanks

no Detections

4. Laboratory Control Sample Results (70-130)

within ac limits

5. Surrogate (if applicable) (70-130)

AA within ac standards

6. Field Duplicate Precision

NA

7. Matrix Spike Results (if applicable)

NA

8. Reporting Limits and Data Completeness

Verified

Client: Olin Corporation

Job Number: 360-41203-1

Sdg Number: 360-41203-1

Client Sample ID:

OC-SD-EDSD/SW7-XXX

Lab Sample ID:

360-41203-1

Client Matrix:

Solid

% Moisture:

17.7

Date Sampled: 06/18/2012 1125

Date Received: 06/19/2012 1000

8260C Volatile Organic Compounds (GC/MS)

Analysis Method: Prep Method:

8260C

5035

Analysis Batch:

360-92620

Instrument ID:

HP #1 GC/MS

Dilution:

1.0

Prep Batch:

360-92619 Lab File ID:

Initial Weight/Volume: 6.02 g

V56959.D

Analysis Date:

07/02/2012 1756

Final Weight/Volume:

5 g

Prep Date:

07/02/2012 1527

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
1,1,1,2-Tetrachloroethane		ND		1.2	2.5
1,1,1-Trichloroethane		ND		1.8	2.5
1,1,2,2-Tetrachloroethane		ND		1.0	2.5
1,1,2-Trichloroethane		ND		1.0	2.5
1,1-Dichloroethane		ND		1.8	2.5
1,1-Dichloroethene		ND		1.6	2.5
1,2,3-Trichloropropane		ND		1.1	2.5
1,2,3-Trichlorobenzene		ND		1.1	2.5
1,2,4-Trichlorobenzene		ND		1.0	2.5
1,2-Dichlorobenzene		ND		1.0	2.5
1,2-Dichloroethane		ND		2.1	2.5
1,3,5-Trimethylbenzene		ND		1.3	2.5
1,3-Dichlorobenzene		ND		1.0	2.5
1,4-Dichlorobenzene		ND		1.0	2.5
1,4-Dioxane		ND		110	250
2,2-Dichloropropane		ND		2.0	2.5
2-Chlorotoluene		ND		1.2	2.5
2-Hexanone		ND	-	14	25
4-Chlorotoluene		ND		1.1	2.5
Acetone		ND	- W	100	250
Benzene		ND		1.7	2.5
Bromobenzene		ND		1.5	2.5
Bromoform		ND		1.6	2.5
Bromomethane		ND		2.3	5.0
Carbon disulfide		ND		1.9	2.5
Carbon tetrachloride		ND		1.7	2.5
Chlorobenzene		ND		1.1	2.5
Chlorobromomethane		ND		1.4	2.5
Chlorodibromomethane		ND		1.2	2.5
1,2-Dibromo-3-Chloropropane		ND		1.4	25
Chloroethane		ND		1.6	5.0
Chloroform		ND		1.5	2.5
Chloromethane		ND		1.4	5.0
cis-1,2-Dichloroethene		ND		1.2	2.5
cis-1,3-Dichloropropene		ND		1.0	2.5
Dibromomethane		ND		1.2	2.5
Dichlorobromomethane		ND		1.3	2.5
Dichlorodifluoromethane		ND		2.1	5.0
Ethylbenzene		ND		1.6	2.5
Ethylene Dibromide		ND		1.1	2.5
Hexachlorobutadiene		ND		1.4	2.5
m-Xylene & p-Xylene		ND		3.0	5.0
2-Butanone (MEK)		ND	-	11	25
4-Methyl-2-pentanone (MIBK)		ND		9.9	25 25
Methyl tert-butyl ether		ND		1.5	2.5
Company of the Company of the Company of the Company					
Methylene Chloride		ND		2.0	10

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M)W 4/10/ 9/6/12

Client: Olin Corporation

Job Number: 360-41203-1

Sdg Number: 360-41203-1

Client Sample ID:

OC-SD-EDSD/SW7-XXX

DryWt Corrected: Y

Lab Sample ID:

360-41203-1

Client Matrix:

Solid

% Moisture:

17.7

Date Sampled: 06/18/2012 1125

Date Received: 06/19/2012 1000

8270D Semivolatile Organic Compounds (GC/MS) Low Level

Analysis Method: Prep Method:

8270D 3546

Analysis Batch: Prep Batch:

360-92604 360-92527

Qualifier

Instrument ID: Lab File ID:

Inst. B B18002.D

Dilution: 20

Analysis Date: Prep Date:

Analyte

07/02/2012 2205 06

Initial Weight/Volume: Final Weight/Volume:

MDL

40.38 - g 1.0 mL

RL

2 uL

110212012	2200	Final weight volu
6/28/2012	1624	Injection Volume:

Result (ug/Kg)

Allalyte	Drywi Corrected. 1	Result (ug/Ng)	Qualifier	IVIDL	NL	
1,1'-Biphenyl		ND		180	600	***************************************
1,2,4,5-Tetrachlorobenzene		ND		180	600	
1,2,4-Trichlorobenzene		ND		180	600	
1,2-Dichlorobenzene		ND		180	600	
1,3-Dichlorobenzene		ND		180	600	
1,4-Dichlorobenzene		ND		180	600	
1-Methylnaphthalene		ND		180	600	
2,2'-oxybis[1-chloropropane]		ND		180	600	
2,3,4,6-Tetrachlorophenol		ND		180	600	
2,4,5-Trichlorophenol		ND	Constant	180	600	
2,4,6-Trichlorophenol		ND	-	180	600	
2,4-Dichlorophenol		ND		180	600	
2,4-Dimethylphenol		ND		240	600	
2,4-Dinitrophenol		ND		180	600	
2,4-Dinitrotoluene		ND		180	600	
2,6-Dinitrotoluene		ND		180	600	
2-Chloronaphthalene		ND		180	600	
2-Chlorophenol		ND		180	600	
2-Methylnaphthalene		ND		180	600	
2-Methylphenol		ND		360	600	
2-Nitroaniline		ND		180	3000	
2-Nitrophenol		ND		180	600	
3 & 4 Methylphenol		ND		180	600	
3,3'-Dichlorobenzidine		ND		180	1200	
3-Nitroaniline		ND		180	3000	
4,6-Dinitro-2-methylphenol		ND		180	3000	
4-Bromophenyl phenyl ether		ND		180	600	
4-Chloro-3-methylphenol		ND		180	1200	
4-Chloroaniline		ND		180	1200	
4-Chlorophenyl phenyl ether		ND		180	600	
4-Nitroaniline		ND		180	3000	
4-Nitrophenol		ND		180	3000	
Acenaphthene		ND		180	600	
Acenaphthylene		ND		180	600	
Acetophenone		ND		180	600	
Aniline		ND	- us	310	600	
Anthracene		ND		180	600	
Atrazine		ND		180	600	
Azobenzene		ND		180	600	
Benzaldehyde		ND		180	600	
Benzo[a]anthracene		630	- 1	180	600	
Benzo[a]pyrene		670	-	180	600	
Benzo[b]fluoranthene		1000	-)	180	600	
Benzo[g,h,i]perylene		540	J	180	600	
Benzo[k]fluoranthene		450	J	180	600	
Benzoic acid		ND		270	3000	

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TestAmerica Westfield

Client: Olin Corporation

Job Number: 360-41203-1

Sdg Number: 360-41203-1

Client Sample ID:

OC-SD-EDSD/SW7-XXX

Lab Sample ID:

360-41203-1

Client Matrix:

Solid

% Moisture:

17.7

Date Sampled: 06/18/2012 1125

Date Received: 06/19/2012 1000

8270D Semivolatile Organic Compounds (GC/MS) Low Level

Analysis Method: Prep Method:

8270D 3546

Analysis Batch: Prep Batch:

360-92604 360-92527

Instrument ID: Lab File ID:

Inst. B B18002.D

Dilution: 20

Analysis Date: Prep Date:

07/02/2012 2205 06/28/2012 1624

Initial Weight/Volume: Final Weight/Volume:

40.38 g

Injection Volume:

1.0 mL 2 uL

Top Butto.			injocacii volume.				
Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL		
Benzophenone		ND		180	600		
Benzyl alcohol		ND		510	1200		
Bis(2-chloroethoxy)methane		ND		180	600		
Bis(2-chloroethyl)ether		ND		180	600		
3is(2-ethylhexyl) phthalate		1500	⊸B •	180	1200		
Butyl benzyl phthalate		ND		180	600		
Caprolactam		ND		180	600		
Carbazole		ND	*	180	600		
Chrysene		1000		180	600		
Dibenz(a,h)anthracene		ND		180	600		
Dibenzofuran		ND		180	600		
Diethyl phthalate		ND		180	600		
Dimethyl phthalate		ND		180	600		
Di-n-butyl phthalate		ND	*	530	1200		
Di-n-octyl phthalate		ND		300	600		
Fluoranthene		1800	- J	180	600		
luorene		ND		180	600		
lexachlorobenzene		ND		180	600		
lexachlorobutadiene		ND		180	600		
Hexachlorocyclopentadiene		ND		180	1200		
Hexachloroethane		ND		180	600		
ndeno[1,2,3-cd]pyrene		480	J	180	600		
sophorone		ND		180	600		
Naphthalene		ND		180	600		
Vitrobenzene		ND		180	600		
N-Nitrosodi-n-propylamine		ND		180	600		
N-Nitrosodiphenylamine		ND		180	600		
Pentachlorophenol		ND		180	600		
Phenanthrene		640		180	600		
Phenol		ND		310	600		
Diphenyl oxide		ND		180	600		
Pyrene		1100		180	600		
Diphenylamine		ND		180	600		
Surrogate		%Rec	Qualifier	Acceptar	nce Limits		
2,4,6-Tribromophenol		0	X	30 - 130			
?-Fluorobiphenyl		0	X	30 - 130			
2-Fluorophenol		0	X	30 - 130			
Vitrobenzene-d5		0	X	30 - 130			
Phenol-d5		0	X	30 - 130			
erphenyl-d14		0	X	30 - 130			

Client: Olin Corporation

Job Number: 360-41203-1

Sdg Number: 360-41203-1

Client Sample ID:

OC-SD-EDSD/SW7-XXX

Lab Sample ID:

360-41203-1

07/02/2012 2205

06/28/2012 1624

Client Matrix:

Solid

% Moisture:

17.7

Date Sampled: 06/18/2012 1125

Date Received: 06/19/2012 1000

8270D Semivolatile Organic Compounds (GC/MS) Low Level

Analysis Method: Prep Method:

Analysis Date:

Prep Date:

Dilution:

8270D 3546

20

Analysis Batch:

Prep Batch:

360-92604

8

Instrument ID: 360-92527

Lab File ID:

Inst. B B18002.D

Initial Weight/Volume:

40.38 g

Final Weight/Volume:

1.0 mL

Injection Volume:

2 uL

Tentatively Identified Compounds

Number TIC's Found:

Cas Number	Analyte	RT	Est. Result (ug/Kg)	Qualifier
	Unknown	13.36	470	₹J 🎖
	Unknown	13.39	520	-± 1 N
	Unknown	13.43	450	±1 6
	Unknown	13.45	320	TJ N
	Unknown	13.51	370	TJ N
	Unknown	13.54	610	干J N
	Unknown	13.57	610	干J N
	Unknown	13.62	290	TJ N

Client: Olin Corporation

Job Number: 360-41203-1

Sdg Number: 360-41203-1

Client Sample ID:

OC-SD-EDSD/SW7-XXX

Lab Sample ID:

360-41203-1

Client Matrix:

Solid

% Moisture:

17.7

Date Sampled: 06/18/2012 1125

Date Received: 06/19/2012 1000

8315A Carbonyl Compounds (HPLC)

Analysis Method:

8315A 8315_S_Prep Analysis Batch:

640-93636

Instrument ID:

LCM

Prep Method: Dilution:

1.0

Prep Batch:

640-93608

Lab File ID:

1F21M6.d

06/21/2012 1202

Initial Weight/Volume:

20.0 g

Analysis Date: Prep Date:

06/21/2012 0746

Final Weight/Volume: Injection Volume:

4.0 mL 10 uL

Analyte Formaldehyde Acetaldehyde

DryWt Corrected: Y

Result (ug/Kg) 720 ND

Qualifier LN

MDL 95 35

RL120

240

Client: Olin Corporation

Job Number: 360-41203-1

Sdg Number: 360-41203-1

Client Sample ID:

OC-SD-EDSD/SW7-XXX

Lab Sample ID:

360-41203-1

Client Matrix:

Solid

% Moisture:

17.7

Date Sampled: 06/18/2012 1125

Date Received: 06/19/2012 1000

6010C Metals (ICP)

Analysis Method: Prep Method:

6010C

Analysis Batch:

360-92426

Instrument ID:

Varian ICP N/A

Dilution:

3050B

Prep Batch:

360-92320

Lab File ID:

Analysis Date:

2.0

Initial Weight/Volume: Final Weight/Volume:

1.96 g 100 mL

Prep Date:

06/26/2012 1440 06/25/2012 1221

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	RL
Aluminum		5900		0.85	6.2
Silver		2.6		0.064	1.2
Arsenic		57		0.28	2.5
Barium		140		0.29	1.2
Beryllium		0.20	J	0.0047	0.50
Calcium		1500	⊸ B	7.9	25
Cadmium		0.84		0.016	0.50
Cobalt		7.2		0.12	1.2
Chromium		39		0.30	1.2
Copper		270		0.34	2.5
Iron		41000	В	4.5	12
Potassium		290	J	13	500
Magnesium		3300	-B	2.1	25
Manganese		230		0.13	2.5
Sodium		180	J	93	250
Nickel		19		0.18	2.5
Lead		340		0.12	1.2
Antimony		4.0		0.49	1.2
Selenium		ND		0.60	1.2
Tin		5.5 12	J-B U	1.0	12
Thallium		ND		0.37	2.5
Vanadium		16		0.094	1.2
Zinc		450		0.53	6.2

7471A Mercury (CVAA)

Analysis Method:

7471A 7471A Analysis Batch: Prep Batch:

360-92258 360-92245 Instrument ID: Lab File ID:

Final Weight/Volume:

Hg Analyzer 062212.PRN

Prep Method: Dilution:

1.0

06/22/2012 1505

Initial Weight/Volume:

0.23 g 50 mL

Analysis Date: Prep Date:

06/22/2012 1019

DryWt Corrected: Y

Result (mg/Kg) 0.040

Qualifier

MDL 0.025

RL 0.11

Analyte

Mercury

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PROJECT CHEMIST REVIEW RECORD
Method: SW8000B -ORX/Kempore
Laboratory and Lot: Lancaster OLN77
Date: 9/6/12
Reviewer: M. K. Washburn

1. Case Narrative

sevieved

2. Holding time and Sample Collection

OPEX analysis exceeded hold time by 2 day

3. QC Blanks

no detections

4. Laboratory Control Sample Results (20-130)



5. Surrogate (if applicable)

NA

6. Field Duplicate Precision

NA

7. Matrix Spike Results (if applicable)

NA

8. Reporting Limits and Data Completeness

Verifie)



Page 1 of 1

Sample Description: OC-SW-EDSD/SW7-XXX Grab Water

Wilmington MA Superfund Site

LLI Sample # WW 6693008 LLI Group # 1316839 Account # 12670

Project Name: Olin Wilmington, MA / 6107120016

Collected: 06/18/2012 11:10

Olin Corporation

Suite 200

3855 North Ocoee Street

Cleveland TN 37312

Submitted: 06/19/2012 09:30 Reported: 07/06/2012 12:52

SWEDS SDG#: OLN77-01*

CAT No.	Analysis Name		CAS Number	As Received Result	As Received Limit of Quantitation*	As Received Method Detection Limit	Dilution Factor
HPLC	Organics	SW-846	8000B	ug/l	ug/l	ug/l	
02727	Kempore in Water		123-77-3	N.D.	1,000	230	1
02726	Opex in Water		101-25-7	и.D. ИЗ	100	100	1
	The holding time wadata reported. Opex was not detect reporting limit is	ed in the	MDL verification	standard. There	efore, the	·	

General Sample Comments

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory	Sample	Analysis	Record
------------	--------	----------	--------

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02727	Kempore in Water	SW-846 8000B	1	121720024A	06/21/2012 15:28	Michele D Hamilton	. 1
02726	Opex in Water	SW-846 8000B ·	1	121740029A	06/27/2012 12:20	James H Place	1

Client: Olin Corporation

Job Number: 360-41200-1

Sdg Number: 360-41200-1

Client Sample ID:

OC-SW-EDSD/SW-7-XXX

Lab Sample ID:

360-41200-1

Client Matrix:

Water

Date Sampled: 06/18/2012 1110

Date Received: 06/19/2012 1000

8260C Volatile Organic Compounds (GC/MS)

Analysis Method:

8260C

Analysis Batch:

360-92562

Instrument ID:

HP #3 GC/MS

Prep Method:

5030C

Prep Batch:

Lab File ID:

V20100.D

Dilution:

1.0

N/A

Initial Weight/Volume:

5 mL

Analysis Date: Prep Date:

06/29/2012 1725 06/29/2012 1725

Final Weight/Volume:

5 mL

Analyte	Result (ug/L)	Qualifier	MDL	RL	
1,1,1,2-Tetrachloroethane	ND		0.20	1.0	
1,1,1-Trichloroethane	ND		0.20	1.0	
1,1,2,2-Tetrachloroethane	ND		0.20	0.50	
1,1,2-Trichloroethane	ND		0.20	1.0	
1,1-Dichloroethane	ND		0.20	1.0	
1,1-Dichloroethene	ND		0.20	1.0	
1,1-Dichloropropene	ND		0.20	1.0	
1,2,3-Trichlorobenzene	ND		0.20	1.0	
1,2,3-Trichloropropane	ND	LN	0.20	1.0	
1,2,4-Trichlorobenzene	ND		0.20	1.0	
1,2,4-Trimethylbenzene	ND		0.20	1.0	
1,2-Dibromo-3-Chloropropane	ND		2.0	5.0	
1,2-Dichlorobenzene	ND		0.20	1.0	
1,2-Dichloroethane	ND		0.20	1.0	
1,2-Dichloropropane	ND		0.20	1.0	
1,3,5-Trimethylbenzene	ND		0.20	1.0	
1,3-Dichlorobenzene	ND		0.20	1.0	
1,3-Dichloropropane	ND		0.20	1.0	
1,4-Dichlorobenzene	ND		0.20	1.0	
1,4-Dioxane	ND		20	50	
2,2-Dichloropropane	ND		0.20	1.0	
2-Butanone (MEK)	ND		1.3	10	
2-Chlorotoluene	ND		0.20	1.0	
2-Hexanone	ND		2.0	10	
4-Chlorotoluene	ND		0.20	1.0	
4-Isopropyltoluene	ND		0.20	1.0	
4-Methyl-2-pentanone (MIBK)	ND		2.0	10	
Acetone	ND		20	50	
Benzene	ND		0.20	1.0	
Bromobenzene	ND		0.20	1.0	
Bromoform	ND		0.20	1.0	
Bromomethane	ND		0.20	2.0	
Carbon disulfide	ND		0.20	10	
Carbon tetrachloride	ND		0.30	1.0	
Chlorobenzene	ND		0.20	1.0	
Chlorobromomethane	ND		0.20	1.0	
Chlorodibromomethane	ND		0.20	0.50	
Chloroethane	ND		0.21	2.0	
Chloroform	ND		0.20	1.0	
Chloromethane	ND	-	0.20	2.0	
cis-1,2-Dichloroethene	1.1		0.20	1.0	
cis-1,3-Dichloropropene	ND		0.20	0.40	
Dibromomethane	ND		0.20	1.0	
Dichlorobromomethane	ND		0.20	0.50	
Dichlorodifluoromethane	ND	-	0.20	1.0	
Did not be an ability of the state of the st	ND		0.20	1.0	

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Client: Olin Corporation

Job Number: 360-41200-1

Sdg Number: 360-41200-1

Client Sample ID:

OC-SW-EDSD/SW-7-XXX

Lab Sample ID:

360-41200-1

Client Matrix:

Water

Date Sampled: 06/18/2012 1110

Date Received: 06/19/2012 1000

8260C Volatile Organic Compounds (GC/MS)

Analysis Method:

8260C

Analysis Batch:

360-92562

Instrument ID:

HP #3 GC/MS

Prep Method:

5030C

Prep Batch:

Lab File ID:

V20100.D

Dilution:

N/A

Initial Weight/Volume:

5 mL

Prep Date:

1.0

Analysis Date:

06/29/2012 1725 06/29/2012 1725 Final Weight/Volume:

5 mL

Analyte	Result (ug/L)	Qualifier	MDL	RL
Ethylbenzene	ND		0.20	1.0
Ethylene Dibromide	ND		0.20	1.0
Hexachlorobutadiene	ND		0.20	0.40
Isopropyl ether	ND		0.20	10
Isopropylbenzene	ND		0.20	1.0
m-Xylene & p-Xylene	ND		0.50	2.0
Methyl tert-butyl ether	ND		0.20	1.0
Methylene Chloride	ND		1.0	2.0
n-Butylbenzene	ND		0.20	1.0
N-Propylbenzene	ND		0.20	1.0
Naphthalene	ND		2.0	5.0
o-Xylene	ND		0.20	1.0
sec-Butylbenzene	ND		0.20	1.0
Styrene	ND		0.20	1.0
Tert-amyl methyl ether	ND		0.20	5.0
Tert-butyl ethyl ether	ND		0.20	5.0
tert-Butylbenzene	ND		0.20	1.0
Tetrachloroethene	ND		0.20	1.0
Tetrahydrofuran	ND		2.0	10
Toluene	ND		0.20	1.0
trans-1,2-Dichloroethene	ND		0.20	1.0
trans-1,3-Dichloropropene	ND		0.20	0.40
Trichloroethene	ND		0.20	1.0
Trichlorofluoromethane	ND		0.20	1.0
Vinyl chloride	ND		0.20	0.50
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	-	0.20	1.0
2,4,4-Trimethyl-1-pentene	ND		0.20	1.0
2,4,4-Trimethyl-2-pentene	ND	-	0.20	1.0
Cyclohexane	ND		0.20	1.0
Methyl acetate	ND		2.0	20
Methylcyclohexane	ND		0.20	1.0
Surrogate	%Rec	Qualifier Acceptance Limits		
4-Bromofluorobenzene	77	70 - 130		
Toluene-d8 (Surr)	85		70 - 130)
Dibromofluoromethane	102		70 - 130)

Client: Olin Corporation

Job Number: 360-41200-1

Sdg Number: 360-41200-1

Client Sample ID:

OC-SW-EDSD/SW-7-XXX

Lab Sample ID:

360-41200-1

Client Matrix:

Water

Date Sampled: 06/18/2012 1110 Date Received: 06/19/2012 1000

8270D Semivolatile Organic Compounds (GC/MS) Low Level

Analysis Method:

8270D

Analysis Batch:

360-92162

Instrument ID:

Inst. B

Prep Method:

3510C

Prep Batch:

Lab File ID:

B17814.D

Dilution:

1.0

360-92116

Initial Weight/Volume: Final Weight/Volume: 1062 mL 1.0 mL

Analysis Date: Prep Date:

06/20/2012 2015 06/19/2012 1916

Injection Volume:

2 uL

Analyte	Result (ug/L)	Qualifier	MDL	RL	
1,1'-Biphenyl	ND		0.47	4.7	
1,2,4,5-Tetrachlorobenzene	ND		0.47	4.7	
1-Methylnaphthalene	ND		0.047	4.7	
2,2'-oxybis[1-chloropropane]	ND		0.47	4.7	
2,3,4,6-Tetrachlorophenol	ND		0.47	4.7	
2,4,5-Trichlorophenol	ND		0.47	4.7	
2,4,6-Trichlorophenol	ND		0.47	4.7	
2,4-Dichlorophenol	ND		0.47	4.7	
2,4-Dimethylphenol	ND		0.47	4.7	
2,4-Dinitrophenol	ND		0.47	4.7	
2,4-Dinitrotoluene	ND		0.47	4.7	
2,6-Dinitrotoluene	ND		0.47	4.7	
2-Chloronaphthalene	ND		0.47	4.7	
2-Chlorophenol	ND		0.47	4.7	
2-Methylnaphthalene	ND		0.047	0.94	
2-Methylphenol	ND		0.47	4.7	
2-Nitroaniline	ND		0.47	4.7	
2-Nitrophenol	ND		0.47	4.7	
3 & 4 Methylphenol	ND		0.47	4.7	
3,3'-Dichlorobenzidine	ND		0.47	4.7	
3-Nitroaniline	ND		0.47	4.7	
4,6-Dinitro-2-methylphenol	ND		0.47	4.7	
4-Bromophenyl phenyl ether	ND		0.47	4.7	
4-Chloro-3-methylphenol	ND		0.47	4.7	
4-Chloroaniline	ND		0.47	4.7	
4-Chlorophenyl phenyl ether	ND		0.47	4.7	
4-Nitroaniline	ND		0.47	4.7	
4-Nitrophenol	ND		0.47	4.7	
Acenaphthene	ND		0.047	0.94	
Acenaphthylene	ND		0.047	0.28	
Acetophenone	ND		0.47	4.7	
Aniline	ND	LN T	0.47	4.7	
Anthracene	ND		0.066	0.94	
Atrazine	ND		0.47	4.7	
Azobenzene	ND		0.47	4.7	
	ND ND		0.47	4.7	
Benzaldehyde	ND		0.16	0.28	
Benzo[a]anthracene	ND ND		0.097	0.19	
Benzo[a]pyrene	ND		0.14	0.28	
Benzo[b]fluoranthene	ND ND		0.089	0.47	
Benzo[g,h,i]perylene	ND ND		0.16	0.28	
Benzo[k]fluoranthene	ND ND		0.47	4.7	
Benzoic acid	ND ND		0.47	4.7	
Benzophenone	ND ND		0.47	9.4	
Benzyl alcohol	ND ND		0.47	4.7	
Bis(2-chloroethoxy)methane			0.47	4.7	
Bis(2-chloroethyl)ether	ND		0.47	4.7	

TestAmerica Westfield

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Client: Olin Corporation

Job Number: 360-41200-1

Sdg Number: 360-41200-1

Client Sample ID:

OC-SW-EDSD/SW-7-XXX

Lab Sample ID:

360-41200-1

Client Matrix:

Water

Date Sampled: 06/18/2012 1110 Date Received: 06/19/2012 1000

8270D Semivolatile Organic Compounds (GC/MS) Low Level

Analysis Method:

8270D

Analysis Batch:

360-92162

Instrument ID:

Inst. B

Prep Method:

3510C

Prep Batch:

360-92116

Lab File ID: Initial Weight/Volume: B17814.D

Dilution:

1.0

.

Initial Weigl

1062 mL 1.0 mL

Analysis Date: Prep Date: 06/20/2012 2015 06/19/2012 1916 Final Weight/Volume: Injection Volume:

2 uL

Analyte	Result (ug/L)	Qualifier	MDL	RL
Bis(2-ethylhexyl) phthalate	ND		0.47	1.9
Butyl benzyl phthalate	ND		0.47	4.7
Caprolactam	ND	EN Lan	0.47	4.7
Carbazole	ND		0.47	4.7
Chrysene	ND		0.16	0.94
Dibenz(a,h)anthracene	ND		0.060	0.47
Dibenzofuran	ND		0.47	4.7
Diethyl phthalate	ND		0.47	4.7
Dimethyl phthalate	ND		0.47	4.7
Di-n-butyl phthalate	4-4-4-7	JB 4	0.57	4.7
Di-n-octyl phthalate	ND		0.69	4.7
Fluoranthene	ND		0.19	0.94
Fluorene	ND		0.075	0.94
Hexachlorobenzene	ND		0.47	0.94
Hexachlorocyclopentadiene	ND		0.47	4.7
Hexachloroethane	ND		0.47	2.8
Indeno[1,2,3-cd]pyrene	ND		0.074	0.47
Isophorone	ND		0.47	4.7
N-Nitrosodi-n-propylamine	ND		0.47	4.7
N-Nitrosodiphenylamine	ND		0.47	4.7
Nitrobenzene	ND		0.47	4.7
Pentachlorophenol	ND		0.47	0.94
Phenanthrene	ND		0.080	0.19
Phenol	ND		0.47	4.7
Pyrene	ND		0.18	4.7
Phenyl ether	ND		0.47	4.7
Surrogate	%Rec	Qualifier	Acceptance L	imits

30

19

75

95

94

71

15 - 110

15 - 110

30 - 130

15 - 110

30 - 130

30 - 130

2-Fluorophenol

Nitrobenzene-d5

Terphenyl-d14

2-Fluorobiphenyl

2,4,6-Tribromophenol

Phenol-d5

Client: Olin Corporation

Job Number: 360-41200-1

Sdg Number: 360-41200-1

Client Sample ID:

OC-SW-EDSD/SW-7-XXX

Lab Sample ID:

360-41200-1

Client Matrix:

Water

Date Sampled: 06/18/2012 1110

Date Received: 06/19/2012 1000

8270D Semivolatile Organic Compounds (GC/MS) Low Level

Analysis Method:

8270D

Analysis Batch:

360-92162

Instrument ID:

Inst. B

Prep Method:

3510C

Prep Batch:

360-92116

Lab File ID:

B17814.D

1.0

Dilution: Analysis Date:

Initial Weight/Volume: Final Weight/Volume: 1062 mL 1.0 mL

Prep Date:

06/20/2012 2015 06/19/2012 1916

Injection Volume:

2 uL

Tentatively Identified Compounds

Number TIC's Found:

10

Cas Number	Analyte	RT	Est. Result (ug/L)	Qualifier
•••••	Unknown	1.74	58	⁴FJM
111-76-2	Ethanol, 2-butoxy-	5.81	0.67	∓ JN
541-2-6	Cyclopentasiloxane, decamethyl-	8.31	4.1	TJN
540-97-6	Cyclohexasiloxane, dodecamethyl-	9.61	0.54	TJN
Unknown	Unknown	10.05	0.43	TJN
100-23-2 Benzenamine, N Unknown Unknown Unknown Unknown	Benzenamine, N,N-dimethyl-4-nitro-	12.44	1.2	-T J N
		14.64	0.63	IJN.
	Unknown	14.67	1.5	干JN
		14.77	1.8	IN LI
		15.38	1.6	TJ N